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COMPILED FROM WORLD LITERATURE ON PLANT PATHOLOGY AND APPLIED MYCOLOGY

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The literature on agricultural insect pests is abstracted in the *Review of Applied Entom logy*, Series A, and that on plant pathogenic nematodes in *Helminthological Abstrac* Additional references to deficiency diseases will be found in *Soils & Fertilizers*, to pla breeding in relation to disease in *Plant Breeding Abstracts*, and to forestry problems *Forestry Abstracts*. All these journals except the first are obtainable from Central Sal Dept., Farnham House, Farnham Royal, Bucks. The *Review of Applied Entomology* is so by the Commonwealth Institute of Entomology, 56 Queen's Gate, London, S.W. 7.

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COMMONWEALTH MYCOLOGICAL INSTITUTE

List of Periodicals and Serial Publications Regularly Examined for the Review of Applied Mycology

JULY 1960

Whenever possible, the abbreviated titles are those of the *World List of Scientific Periodicals*, ed. 3, 1952.

Acta agric. scand.
Acta agrobot.
Acta agron., Palmira
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Acta microbiol. sinica
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Angew. Bot.
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Atti Accad. Torino
Atti Ist. bot. Univ. Pavia
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Aust. J. agric. Res.
Aust. J. biol. Sci.
Aust. J. Bot.
Aust. J. exp. Biol. med. Sci.
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Bact. Rev.
Bayer. landw. Jb.
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Ber. bayer. bot. Ges.
Ber. dtsch. bot. Ges.
Bergcultures, *see* Menara Perkebunan
Ber. Inst. Tabakforsch. Dresden
Ber. Ōhara Inst.
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Bot. Mag., Tokyo
Bot. Notiser
Bot. Rev.
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Bull. agron. Fr. d'outre-mer
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Bull. Conn. agric. Exp. Sta.
Bull. Cornell agric. Exp. Sta.
Bull. Dep. Agric. Mauritius
Bull. Dep. Agric. S. Afr.
Bull. Dep. Agric. Trin. Tob.
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Bull. Fac. Agric. Hirosaki Univ.
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Bull. mens. Soc. linn. Lyon
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Bull. Soc. Hist. nat. Toulouse
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Bull. Wash. St. Dep. Agric.
Bull. Wis. agric. Exp. Sta.
Bull. W. Va agric. Exp. Sta.
Bull. W. Va Univ.
Bull. Wyo. agric. Exp. Sta.

Cacao (Int.-Amer. Cacao Cent.)
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Calif. Citrogr.
Camellian
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Canad. J. Pl. Sci.
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C.C.H. mykol. Sborn.
Cereal Chem.
Čes. Mykol.
Chem. Abstr.
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Circ. Calif. agric. Ext. Serv.
Circ. Estác. exp. agríc. Tucumán
Circ. Fla agric. Exp. Stas
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Commonw. phytopath. News
Comun. Acad. Repub. rom.
Contr. Boyce Thompson Inst.
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Čsl. Biol.
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Darwiniana, B. Aires
Diss. Abstr.
Down to Earth.
Dtsch. Landw., Berl.

E. Afr. agric. J.
Econ. Bot.
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Eesti Loodus (= Nature, Estonia)
Emp. Cott. Gr. Rev.
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Ent. Phytopath. appl., Tehran
Euphytica
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F.A.O. Plant Prot. Bull. (and other F.A.O. publications)
Flygbl. Skogsforskningsinst.
Flygbl. Växtskyddsanst.
Fmg in S. Afr.
Fm Home Sci., Utah
Fmrs' Bull. U.S. Dep. Agric.
Folia microbiol., Delft
Foll. Divulg. Secret. Agric. Méx.
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Food & Agric., Rome
Food Pack.
Food Res.
Food Sci. Abstr.
For. Abstr.
For. Bull. Dehra Dun, N. S., Mycol.
For. Chron.
For. Pest Leafl. U.S. Dep. Agric.
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For. Sci.
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Friesia
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Indian J. mycol. Res.
Indian Phytopath.
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Indust. aliment.
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J. agric. chem. Soc. Japan
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Nat. agric. Chemic. Ass. News
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Pap. Mich. Acad. Sci.
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Phytiatrie-Phytopharm.
Phytopath. Class.
Phytopathology
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Publ. Dep. Agric. Can.
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Publ. For. Prod. Lab., Madison
Publ. Inst. nat. agron. Congo belge
Publ. tech. Inst. belg. Amélior. Better.
Pulp Pap. (Mag.) Can.

Qd agric. J.
Qd J. agric. Sci.
Qual. Plant. Mater. veg.
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Rapp. Inst. Étud. agron. Congo belge
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Rec. Res. Fac. Agric. Univ. Tokyo
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Rep. Boyce Thompson Inst.
Rep. Brit. Cameroons Development. Corp.
Rep. Brit. Leath. Mfrs' Ass.
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Rhod. agric. J.
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Rhod. Tobacco
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Riv. Agric. subtrop.
Robigo
Roczn. Nauk rol.
Rodriguésia
R.R.I. Plant Bull.

S.Afr. J. agric. Sci.
S.Afr. J. Sci.
S.Afr. Sug. J.
Schweiz. Z. Obst- u. Weinb.
Schweiz. Z. Pilzk.
Sci. Bull. Dep. Agric. S.Afr.
Sci. Bull. Fac. Agric. Kyushu
Sci. & Cult.
Science
Sci. Hort.
Sci. Proc. R. Dublin Soc.
Sci. Rep. agric. Res. Inst. N. Delhi
Sci. Rep. Fac. Agric. Saikyo Univ. (now Kyoto Univ. Agric.)
Sci. Rep. Kagoshima Univ.
Sci. Rep. Tôhoku Univ., Ser. Biol.
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Stain Tech.
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Sydowia
Symb. bot. upsaliens.

Tabacco, Roma
T.A.P.P.I.
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Tech. Commun. Bur. Sug. Exp. Stas Qd
Tech. Pap. sci. ind. Res. Org. (Div. Pl. Ind.), Melbourne
Techn. Publ. Canterbury agric. Coll.
Tehn. Pertan., Indonesia
Text. Res. J.
Tidsskr. Planteavl.
Tijdschr. PlZiekt.
Timb. Tech.
Tobacco Abstr.
Trans. bot. Soc. Edinb.
Trans. Brit. mycol. Soc.
Trans. mycol. Soc. Japan
Trans. N.Y. Acad. Sci.
Trans. roy. Soc. N.Z.
Trans. Wis. Acad. Sci. Arts Lett.
Trop. Agriculture, Trin.
Trop. Agriculturist
Turrialba
Two & a Bud (News Lett. Tocklai exp. Sta.)

Umschau
Unasylva
Valt. Maatalousk. Julk.
Valt. Maatalousk. Tiedon.
Växtskyddsnotiser, Stockh.
Versl. PlZiekt. Dienst Wageningen
Virology

Weinberg u. Keller
Willdenowia
Wiss. Z. Friedrich-Schiller-Univ.
Wood

Yearb. Agric. U.S. Dep. Agric.

Z. Acker- u. PflBau
Z. angew. Chem.
Z. Naturf., B
Z. PflErnähr. Düng.
Z. PflKrankh.
Z. Pilzk.
Z. Zuckerind. (Čsl. Repub.)
Zbl. Bakt., Abt. 2
Zucker

JOURNALS OF U.S.S.R.

Adv. mod. Biol., Moscow, (W.L.)
Agrobiology, Moscow, (W.L.)
Antibiotiki [Антибиотики]

Biochemistry, Leningr., (W.L.)
Bot. Mater. (*Notul. syst. sect. crypt. Inst. bot. Acad. Sci. U.S.S.R.*), (W.L.)
Bot. Zh. S.S.S.R. (W.L.)
Bull. Acad. Sci. U.R.S.S., Ser. biol. (W.L.)
Bull. Soc. Nat., Moscou, Ser. biol. (W.L.)
Byull. glav. bot. Sada, Moskva Бюлл. глав. бот. Сада, Москва

C. R. Acad. Sci. U.R.S.S., (W.L.)

Dokl. Akad. Nauk Azerb. S.S.R. [Докл. Акад. Наук Азерб. ССР].
Doklady (see also *C.R.* and *Proc.*)

Izv. Akad. Nauk Armyan. S.S.R. [Изв. Акад. Наук Армян. ССР], biol. agric. Sci.
Izv. Akad. Nauk Azerb. S.S.R. [Изв. Акад. Наук Азерб. ССР], Ser. biol. agric. Sci.
Izv. Akad. Nauk Éston. S.S.R. [Изв. Акад. Наук Эстон. ССР], Ser. biol.
Izvestiya (see also Bull.)

J. agric. Sci., Moscow (W.L.)
J. Bot. Acad. Sci. Ukr. (W.L.)
J. Microbiol., Kiev, (W.L.)

Kartofel' [Картофель]
Kukuruza [Кукуруза]

Les. Khoz. [Лес. Хоз.]

Mezh. sel.-khoz. Zh. [Меж. сел.-хоз. Ж.]
Microbiology, Moscow, (W.L.)

Nauch. Dokl. vysh. Shkol. [Науч. Докл. высш. Школ], biol. Sci.
Nauch. Trud. erevansk. Univ., Ser. biol. Sci. (W.L.)

Pedology, Leningr., (W.L.)
Priroda, Moskva [Природа, Москва]
Proc. Acad. Sci. Armen. S.S.R., (W.L.)
Proc. Lenin Acad. agric. Sci. (W.L.)
Proc. Timiryazev agric. Acad. (W.L.)

Referat. Zh. Biol. [Реферат. Ж. Биол.]
Rep. Acad. Sci. Ukr. (W.L.)

Sad i Ogorod (W.L.)
Sadovod. Vinogradarst. Vinodel. [Садовод. Виноградарст., Винодел.]
Sakhar. Svekla [Сахар. Свекла]
Sel. Seed-Gr., Moscow, (W.L.)
Soobshch. Inst. Lesa [Сообщ. Инст. Леса]
Sug. Ind., Moscow (W.L.)

Trud. Inst. Bot. Akad. Nauk Kazakh. S.S.R. [Труд. Инст. Бот. Акад. Наук Казах. ССР]
Trud. vsesoyuz. Inst. Zashch. Rast. [Труд. всесоюз. Инст. Защ. Раст.]

Ves. Akad. Navuk Belarus. S.S.R. [Вес. Акад. Навук Беларус. ССР], biol. Sci.
Vestn. Akad. Nauk Kazakh. S.S.R. [Вестн. Акад. Наук Казах. ССР]
Vestn. Leningr. Univ. [Вестн. Ленингр. Унив.], Ser. biol.
Vestn. Moskov. Univ. [Вестн. Москов. Унив.], Ser. biol.
Visn. Akad. Nauk Ukr. [Вісн. Акад. Наук Укр.]
Vitic. & Wine-Mak., Moscow, (W.L.)
Vop. Virusol. [Воп. Вирусол.]

Za sots. sel.-khoz. Nauk
Zashch. Rast., Moskva [Защ. Раст. Москва]

Abbreviated titles of Russian journals not included in the World List (W.L.) have been transliterated according to the British Standard's system (B.S. 2979: 1958).

Many other journals not regularly searched contain occasional papers which are noticed from originals or separates when traced. Reports and Proceedings of International Conferences and Congresses (Botanical, Horticultural, Cacao, Potato, Sugarcane, Viruses, etc.) are also examined.

WIESNER (K.). **Die Bedeutung der virösen Rübenvergilbung für die DDR. II. Die durch diese Virose verursachten Ertragsausfälle.** [The importance of Beet yellows virus for the German Democratic Republic. II. The yield reductions caused by this virosis.] –*Zuckererzeugung*, **4**, 1, pp. 23–28, 1 graph, 1960.

The principal reason for the relatively low incidence of infection as compared with that prevailing in W. Germany is the late (mid-June) influx of the aphid vectors [**39**, 201], *Myzus persicae* and *Doralis* [*Aphis*] *fabae*. This results in a corresponding delay of primary infection, the av. of which in mid-July, mid-Aug., and mid-Sept. 1953–57 was 0·9, 19·8, and 42·5%, respectively. The max. loss of sucrose during the 5-yr. period was 30–35%/ha., a figure unlikely to be reached except locally in seasons of very heavy infection. More important is the qualitative and quantitative deterioration of the leaves which are the main source of nutriment in the fodder.

STEUDEL (W.), HEILING (A.), & HANF (E.). **Versuche zur inneren Therapie bei Beta-Rüben durch Saatgutbehandlung mit systemischen Präparaten.** [Experiments on the internal therapy of *Beta*-Beets by seed treatment with systemic preparations.] –*Z. angew. Ent.*, **44**, 4, pp. 387–404, 9 graphs, 1959. [Engl. summ.]

This is a comprehensive, fully tabulated survey of the results of small-scale trials during 1951–56 at Elsdorf and Münster and of field experiments in Rhineland, Rhenish Palatinate, and Westphalia in 1957, using systemic aphicides from the Farbenfabriken Bayer, Leverkusen, with activated charcoal as a carrier [cf. **32**, 529 *et passim*].

The active principles entered the plants through the seed, persisting for weeks in the greenhouse and up to the middle or end of June in the field, according to the sowing date.

The treatment proved effective against *Myzodes* [*Myzus*] *persicae*, especially in early attacks, and the larvae of *Pegomyia hyoscyami*, but the spread of beet yellows virus was only partially controlled. Phytotoxic symptoms and impairment of germination were observed in some seasons, resulting in a stand decrease of about 11% in the field trials. However, the treated plots frequently yielded substantial increases in roots and sugar.

MÜNSTER (J.) & JOSEPH (E.). **La lutte contre la jaunisse de la Betterave à l'aide de produits systémiques s'impose-t-elle?** [Is the control of Beet yellows with systemic materials necessary?] –*Rev. rom. Agric.*, **15**, 11, pp. 89–91, 1959.

This note from the Stations fédérales d'essais agricoles, Lausanne, recommends that where beet yellows occurs regularly and where the infection level exceeds 25–30% towards late Aug.–early Sept., a preventive spraying with a systemic aphicide (e.g. ekatine or dimecron 20) should be given, followed by another, 10–15 days later, if the danger of infection persists [cf. **34**, 622]. The 1st application should be given early, but its effectiveness increases with the age of the plants, so that early sowing is advantageous [**38**, 722].

HEUVER (H.). **Bestrijding van vergelingsziekte in Bieten.** [Control of yellows disease in Beets.] –*Landbouwvoorlichting*, **17**, 2, pp. 81–87, 2 graphs, 1960.

The results of 4 small-scale tests and 1 field experiment by branches of the Plantenziektenkundige Dienst, Wageningen, in various parts of the Netherlands are described and tabulated. The aphid vectors [*Myzus persicae* and *Aphis fabae*] of

yellows virus were effectively combated by 1–3 applications at fortnightly intervals of endothion (1 kg./ha.), fosfamidon (1 l.), demeton-methyl, and demeton (both at 0·5 l.). In 1 small-scale test and in the field trial the treatments (irrespective of number) delayed the appearance and spread of the disease by about 2 weeks; in the others there was no effect. Yields were very favourably influenced by the sprays, sugar production in the field experiment being increased by 38 and 44% over the untreated by 1 and 2 applications, respectively, while in a test on sandy soil the twice-sprayed plants yielded 23% more sugar than the controls.

GORYUSHIN (V. A.). Эпифитотиология желтухи Сахарной Свеклы на Украине. [The epiphytology of Sugar Beet yellows in the Ukraine.] *Proc. Lenin Acad. agric. Sci.*, **24**, 10, pp. 31–36, 4 fig., 1 graph, 1959.

Some of this information from the D. K. Zabolotnyĭ Inst. of Microbiol., Acad. Sci. Ukrainian S.S.R., on the detection of beet yellows virus in the Ukraine, identified by aphid transmission and serological experiments, has been noticed [**37**, 430]. Beet yellows was especially widespread on farms where industrial and seed beet were in close proximity. The Ukrainian virus appears to be a weak form. Other closely related virus diseases were also encountered. In the western and central Ukraine infected plants appear at the end of June or beginning of July and their numbers gradually increase, reaching a max. at the end of Sept. Losses are highest when the disease appears early. At the Cherkasskaya agric. exp. Sta. in 1958 the loss in root yield was 25% and sugar 2·7%. Yellows was also detected serologically in fodder beet, spinach, and the weeds of beet fields *Chenopodium album*, *C. polyspermum*, *Atriplex rosea*, *Amaranthus retroflexus*, *Plantago major*, *P. media*, *Capsella bursa-pastoris*, and *Senecio vulgaris*. *Myzodes* [*Myzus*] *persicae* is rare in the region. Control measures are discussed.

PELET (F.). **Les maladies à virus des Légumineuses. I. Virus s'attaquant aux Légumineuses et à d'autres plantes. II. Virus qui n'affectent que les Légumineuses.** [Virus diseases of Legumes. I. Viruses attacking Legumes and other plants. II. Viruses affecting Legumes only.] —*Rev. rom. Agric.*, **15**, 11, pp. 91–94, 8 fig.; 12, pp. 100–102, 8 fig., 1959.

Most of the diseases briefly described or mentioned in the 1st paper were observed by the author in Switzerland in 1959: they are the viruses of bean yellow mosaic on bean [*Phaseolus vulgaris*] and other legumes, cucumber mosaic (on a number of leguminous hosts, which are listed), tobacco necrosis on bean and white melilot [*Melilotus alba*], lucerne mosaic, clover phyllody [**37**, 547], lettuce mosaic (causing mosaic of pea), and tomato spotted wilt (infecting pea and bean).

The 2nd covers, in like manner, the viruses of bean common mosaic, pea enation mosaic, pea mosaic, 'pea yellows' (top yellows) [pea leaf roll], and 'pea necrosis' (pea streak) [**37**, 748], white clover mosaic (pea mottle [and pea wilt: **21**, 293; **39**, 113]), and vein mosaic of red clover [**39**, 321], which winters in this host, but is aphid-transmitted to pea in the spring, causing dwarfing and leaf roll.

MACNEILL (B. H.) & HOWARD (HELEN). **Near-wilt of Peas in Ontario.** —*Canad. J. Pl. Sci.*, **39**, 4, pp. 483–490, 2 pl., 1959.

A more detailed account from Ont. agric. Coll., Guelph, of information already noticed [**38**, 377].

HEPPLE (SHIRLEY) (MRS. D. L. LEE). **Infection of Peas by wilt disease fungi.** —*Nature, Lond.*, **185**, 4709, pp. 333–334, 1960.

Causal agents of this disease were identified at the Sch. Agric., Univ. Cambridge, as *Fusarium oxysporum* f. *pisi* [**38**, 652] and *F. oxysporum* var. *redolens* [**35**, 411]. When the 1st symptoms appear (wilting of the lowermost leaves), no discoloration

is apparent except in the cotyledonary vascular bundles, from which region only were the fungi isolated. This indicates that plants grown from seed in naturally infected soil are invaded through the dying cotyledons. Only when, occasionally, the root encircled the seed before growing downwards was infection noticed at the junction of the tap root and an upper lateral root.

MALOY (O. C.). **Physiology of Fusarium solani f. phaseoli in relation to saprophytic survival in soil.**—*Phytopathology*, **50**, 1, pp. 56–61, 1960.

In further studies at Cornell Univ., Ithaca, N.Y., some of which have been noticed [cf. **38**, 723], the conidial (C) and mycelial (M) forms of the fungus, obtained by plating conidia of a virulent isolate, were compared for their ability to colonize non-host-plant tissues saprophytically [cf. **39**, 257], by placing pieces of sterilized root and stem tissue of bean [*Phaseolus vulgaris*], lucerne, or wheat in sterile or unsterile soil inoculated with the fungus, incubating for 6 weeks, and then placing the tissue, after washing and abrasive removal of the epidermis, in contact with the roots of a Red Kidney bean seedling in steamed soil. There was little difference in colonization of plant tissues by either type in sterile soil, but in unsterile soil colonizing ability was reduced, especially on wheat tissue, and the M type colonized some tissues, e.g. lucerne, somewhat better than others.

The C type proved more virulent to bean than the M even when washed to remove conidia, the mycelium alone and the spore suspension each causing severe root rot.

When a mixed inoculum of spores of the 2 types at 1,000 g. was added to soil and samples were plated at intervals there was a continuous increase in numbers (total of both types) up to 15 weeks with a slight decrease at 20 weeks; results were similar but more pronounced in similar soil amended with 1% soybean meal; the M type, however, appeared to predominate under limited nutritional conditions. Isolation of the fungus from bean plants grown in soil cropped previously with various rotation plants suggested that the M type predominates in the prolonged absence of a host.

MATSUO (T.), SAKURAI (Y.), & KURATA (H.). **The form names of Fusarium oxysporum and F. moniliforme causing Soybean wilt.**—Abs. in *Ann. phytopath. Soc. Japan*, **24**, 1, p. 26, 1959. [Jap.]

Some of this information from Shinshū Univ. and the Inst. exp. Hygiene has been noticed [**38**, 643], i.e. that *F. oxysporum* f. [*F. bulbigenum* var.] *tracheiphilum* is one agent of soybean wilt. Cross-inoculation experiments demonstrated that *F. moniliforme* [*G. fujikuroi*] from soybean and from bakanae rice were identical.

HILDEBRAND (A. A.). **A root and stalk rot of Soybeans caused by Phytophthora megasperma Drechsler var. sojae var. nov.**—*Canad. J. Bot.*, **37**, 5, pp. 927–957, 4 pl. (18 fig.), 1 fig., 4 graphs, 1959.

P. megasperma var. *sojae* is suggested as being a more correct designation of the causal fungus of the root and stalk rot of soybeans both in southwestern Ont., where it is prevalent, and in several areas in the U.S.A., where it was reported to be caused by *P. cactorum* or *P. sojae* [**38**, 642]. The new taxon, studied at the Res. Sta., Harrow, Ontario, was shown to include strains indistinguishable morphologically but differing physiologically and pathogenically. Comparisons with the Ohio and Illinois isolates showed them to be alike morphologically. Tests of different vars., breeding lines, and selections of soybeans showed that there are 2 well-defined types of reaction to infection: var. Harosoy, extensively grown in Ont., was highly susceptible; Blackhawk, Monroe, Illini, Hailey, A.K. (Harrow), and Mukden were resistant. In pathogenicity tests on many wild and cultivated hosts marked specificity of *P. megasperma* var. *sojae* for soybean was apparent. Eight bean

[*Phaseolus vulgaris*] vars. and Lima bean [*P. lunatus*] developed internal lesions but none was killed. No other species was attacked. The *Phytophthora* sp. from sweet clover [**33**, 729] was found to be quite distinct.

Lévêque (L. A.) & Beley (J.). **Contribution à l'étude de la nutrition minérale de l'Arachide (Arachis hypogaea). Effets des toxicités borique et manganique.** [A contribution to the study of the mineral nutrition of the Groundnut. The effects of boron and manganese toxicity.]—*Agron. trop., Paris*, **14**, 6, pp. 657–710, 4 pl. (2 col.), 68 graphs, 8 diag., 1959. [Engl., Span. summ. 13 ref.]

Sand cultures at the Centre technique d'Agric. trop., Nogent-sur-Marne, France, demonstrated that the opt. B dosage for groundnuts is about 0·75 p.p.m. and the threshold of B toxicity slightly below 3 p.p.m. Growth is greatly affected by excess B, the leaves, in which B accumulates, becoming malformed with large inhibition areas spreading from the edges of the leaflets to the centre; flowering and fruiting decrease as B conc. in the nutrient solution increases. B does not accumulate in the stems. An increase of B in the nutrient medium induces an accumulation of Mg and Ca in the leaves and an increase in the K reserves.

The opt. dosage for Mn is over 0·2 p.p.m., and toxic effects appear at 5 p.p.m. [cf. **38**, 119]. With high Mn concs. brown marginal spots appear at the ends of the leaflets or a marked drying of the blade occurs, flowering is slightly retarded, fertilization inhibited, and ripening of the fruit delayed. At 20 p.p.m. young leaves blister. High concs. of Mn stimulate the absorption of N, P, and Mg and reduce that of K and Ca.

Brien (R. M.), Chamberlain (E. E.), Dye (D. W.), Harrison (R. A.), & Smith (H. C.). **Diseases and pests of Onions in New Zealand and their control.**—*Inform. Ser. N.Z. Dep. sci. industr. Res.* 24, 24 pp., 13 fig., 1959.

The diseases covered by this publication, which gives notes on symptoms and control, are downy mildew (*Peronospora destructor*) [**34**, 17], smut (*Urocystis cepulae*) [**33**, 652], white rot (*Sclerotium cepivorum*), neck rot (*Botrytis allii*) [**18**, 726], damping off (*Pythium* spp., *Rhizoctonia* [*Corticium*] *solani*), soft rot (*Erwinia carotovora*), and yellow dwarf (virus) [**28**, 503]. Minor infections have also been recorded of rust (*Puccinia allii*), black mould (*Aspergillus niger*), blue mould (*Penicillium* spp.), and basal rot due to *Fusarium* spp. [cf. **38**, 725], the last 3 occurring in storage, and leaf mould (*Pleospora herbarum*) following downy mildew infection.

Segall (R. H.) & Newhall (A. G.). **Onion blast or leaf spotting caused by species of Botrytis.**—*Phytopathology*, **50**, 1, pp. 76–82, 5 fig., 1960.

An expanded account from Cornell Univ., Ithaca, N.Y. [cf. **34**, 17]. Blast usually occurs in the field when the foliage area is max. and before the bulbs have enlarged appreciably; leaf flecking or spotting is followed by tip die-back and complete yellowing. The extent of leaf spotting after inoculation with *B. allii* was correlated with the spore load applied. Germinating spores do not penetrate the cuticle or stomata, nor are hyphae found in the lesions, but a toxin produced by the growth of *B. allii* in nutrient broth+dextrose induced, on sprayed plants, spots similar to those caused by spores germinating on the leaf surface. Weekly spraying with various fungicides such as nabam, ferbam, and captan gave a high degree of control.

Schmidt (Trude). **Der Blattbrand der Karotte auch in Österreich.** [Leaf blight of Carrot in Austria also.]—*Pflanzenarzt*, **12**, 9, pp. 98–99, 2 fig., 1959.

Alternaria porri f. sp. *dauci* [*A. dauci*: cf. **36**, 370; **39**, 141] has been observed in recent years on carrots in Austria. Control trials will be carried out at the Bundesanstalt für Pflanzenschutz, Vienna, in 1960.

Webb (R. E.), Perry (B. A.), Jones (H. A.), & McLean (D. M.). **A new source of resistance to Spinach blight.**—*Phytopathology*, **50**, 1, pp. 54–56, 1960.

At Beltsville, Md, a spinach var. (P.I. 179590) introduced from Belgium proved highly resistant to spinach blight caused by cucumber virus 1 strs. [cucumber mosaic virus: see below; cf. **36**, 507] at temps. up to 28° C. and more so than Virginia Savoy. Inoculation of the progeny of crosses of this new var. with the susceptible Bloomsdale showed resistance to be controlled by 1 dominant gene.

Doolittle (S. P.) & Webb (R. E.). **A strain of Cucumber virus 1 infectious to blight-resistant Spinach.**—*Phytopathology*, **50**, 1, pp. 7–9, 1960.

At Beltsville, Md. a cucumber mosaic virus (CMV) str. isolated from *Commelina nudiflora* proved lethal to spinach vars. (including P.I. 179590) [see above] resistant to all other strs. of CMV tested. It was also distinguishable from the typical str. by its reactions, which are described, on a number of other hosts; the physical properties of both strs. were similar.

Way (J. M.) & Keyworth (W. G.). **Experiments on the control of Botrytis disease of Lettuce.**—*Ann. appl. Biol.*, **47**, 4, pp. 685–697, 1959.

The results are presented from the Nat. Veg. Res. Sta., Wellesbourne, Warwick, 1955–57, of fungicidal tests against *Botrytis* disease [*Botrytis cinerea*: cf. **37**, 512, 622; **38**, 645] on May Queen and May Princess matured in frames Nov.–Apr. and Trocadero Improved grown as seedlings in frames Nov.–Mar. and then matured in the field Mar.–June. The frame lettuces were treated throughout growth and the others in the seedling stage only.

On both kinds 0·33% fernide sprays applied up to 5 times gave the best control; on the frame crop 5% folosan dust was effective in 2 of 3 yr. either on the plants or incorporated in the top soil at 15 g. sq. yd. Even in the absence of any plant treatment soil incorporation, which was cheap and simple, gave a 50% reduction in the disease in 1956 and a 75% reduction in 1957; the active ingredient was presumably released from the soil over a much longer period than the soil sterilants tested (formalin and $HgCl_2$) and probably during the time when the plants were most susceptible to attack.

Folosan failed to give good control in the field where 50% orthocide sprays at 0·25% were almost as effective as fernide; it seems likely that these two persisted on the seedlings after planting out, whereas folosan did not. Commercial thiram dusts, though effective, have the disadvantage of producing a nasal irritation in some persons.

Cook (A. A.) & Anderson (C. W.). **Inheritance of resistance to Potato virus Y derived from two strains of Capsicum annuum.**—*Phytopathology*, **50**, 1, pp. 73–75, 1960.

In further studies at Fla agric. Exp. Sta., Gainesville [cf. **38**, 556; **39**, 77], crossing the chilli strs. P11 and S.C. 46252, resistant to potato virus Y, with California Wonder, Florida Giant, Improved Worldbeater, and Yolo Wonder, all susceptible, and backcrossing the F_1 indicated that resistance was inherited as a single recessive, y^a. Both the resistant strs. were homozygous for the recessive allele and the susceptible vars. homozygous for the dominant, Y^a.

D'Oliveira (Maria de L. V.). **Sugestões para combater o 'mosaico' do Melão.** [Suggestions for combating Melon 'mosaic'.]—*Agricultura* (*Rev. Direc. Serv. agríc., Lisboa, 1959*, 2, p. 22, 1 fig., 1959.

Severe attacks of cucumber mosaic virus on melons were reported from Azambuja, Portugal, in 1958. Two methods may be employed to prevent future depredations from this virus, viz. the eradication of such common local weeds as *Senecio praealta*,

Geranium rotundifolium, and *Ranunculus adscendens*, which are symptomless carriers, and regular insecticidal treatments to combat aphid vectors. It is pointed out, however, that the latter measure does not confer absolute protection, since a period of 20–30 min. must elapse between application and the death of the aphids, during which virus transmission can be effected.

McKeen (C. D.). **Cucumber necrosis virus.**—*Canad. J. Bot.*, **37**, 5, pp. 913–925, 2 pl. (9 fig.), 1959.

Cucumber is the only known host which becomes systemically infected by cucumber necrosis virus (CNV) [**38**, 386], which has been isolated several times in the last 7 years from cucumbers under glass in S.W. Ont. Though the virus has many of the properties of tobacco necrosis virus (TNV), it is considered distinct by virtue of the small thermal coefficient, a thermal inactivation point of 75–80° C., and a dilution end point of 10^{-4}–10^{-5}. During the short-day season of greenhouse cucumber production the virus causes severe leaf symptoms, serious stunting, and death 6 weeks–2 months after infection becomes systemic. In unifoliate leaves of cowpea and French bean [*Phaseolus vulgaris*] CNV has lower invasive capacity than TNV and after a series of transfers of sap from cowpea leaves infected by the 2 viruses TNV became predominant.

Plate (H.-P.). **Zur Bekämpfung des Blattbrandes der Gurke.** [Control of leaf blight of Cucumber.]—*NachrBl. dtsch. PflSchDienst, Stuttgart*, **11**, 11, pp. 165–166, 1959.

In a trial by the Pflanzenschutzamt Berlin in 1958 at a Berlin nursery Hg carbamate or a phenyl-Hg compound at 0·1%, or maneb at 0·2 or 0·4%, applied 7 times during 9 July–20 Aug., controlled *Corynespora melonis* [*C. cassiicola*: cf. **32**, 342] on cucumber. Of these fungicides only maneb can be recommended for use in practice.

Badami (R. S.). **The antigenicity of Dolichos enation mosaic virus.**—*Curr. Sci.*, **28**, 12, pp. 481–482, 1959.

This disease [**27**, 309] has recently been noted in Mysore and Madras States and investigated by the Univ. Bot. Lab., Madras [**38**, 726]. Rabbits were immunized with an extract (pH approx. 5·7) prepared from the sap of leaves with mosaic symptoms 15–20 days after inoculation. The antiserum obtained reacted with the sap of infected (but not healthy) plants giving titres up to 1/625. The antiserum gave a dense granular precipitate, suggesting spherical virus particles, but produced no precipitate when tested against tobacco mosaic virus.

Conroy (R. J.). **The commercial Mushroom industry in N.S.W.**—*J. Aust. Inst. agric. Sci.*, **25**, 3, pp. 176–183, 3 fig., 1 graph, 1959. [26 ref.]

Reviews the mushroom-growing industry in New South Wales [cf. **38**, 648] over the past 30 yr., with a short section on diseases and competitors and routine preventive measures. Production has increased markedly since 1950, synthetic composts have been adopted, and peat moss used with advantage for casing. Recently *Myceliophthora lutea* was recorded for the 1st time in the State.

Niemeyer (L.) & Bode (O.). **Über den Virusnachweis bei Reben.** [On the demonstration of virus in the Vine.]—*Z. PflKrankh.*, **66**, 10, pp. 640–644, 1959.

This is an official refutation from the Instituten für Rebenkrankheiten, Bernkastel, and für landwirtschaftliche Virusforschung, Brunswick, of a publication by Ochs [**37**, 754; cf. **39**, 148]. When the transmission tests, by which she claimed to have detected the presence in vine of the viruses of cucumber mosaic and potato X and Y, were repeated by Miss Ochs and others in insect-proof houses none of these

viruses was detected. Later tests with the same vines originally used by Miss Ochs were likewise negative. The electron micrographs presented of the viruses were from other hosts.

GÄRTEL (W.). **Die 'flavescence dorée' oder 'maladie du Baco 22 A'.** ['Golden flavescence' or 'disease of Baco 22 A'.]—*Weinbau u. Weink.*, **6**, pp. 295–311, 21 fig., 1 map, 1959.

Having given a description of the disease in France, based on Caudwell's account [**38**, 53] and on his own impressions during a study tour, the author, of the Institut für Rebenkrankheiten, Bernkastel, stresses the need for work on a similar, perhaps identical, disease found in the Mosel and Rhine, and probably also in the Pfalz and Baden districts of Germany.

Plant Pathology Division.—*Res. & exp. Rec. Minist. Agric. N. Ireland*, **8** (*1958*), 2, pp. 173–195, 1959.

In this report [cf. **38**, 387] is described a successful test of the susceptibility of potato vars. to dry rot (*Fusarium caeruleum*) [**37**, 324]: 50 sound tubers of each var. are rotated 25 times in a seed-dressing machine with 2 tubers of a susceptible var. carrying the fungus in a sporing condition, then stored in moist peat at 60° F. for 9 days, and finally removed from the peat and stored for a further 47 days before examination for dry rot.

In further studies on the storage of samples from virus infected plants it was found that potato leaf samples can be stored at $-6°$ C. for 2–3 months without prejudice to the results of sap inoculation for the presence of virus X, and for much longer if stored as minced leaves or crude sap. Virus X retains its infectivity longer in tobacco leaf than in potato leaf samples, probably because of its higher conc. in the latter.

The virus mainly responsible for mosaic and breakdown of Ulster Torch potatoes in 1957 appeared to be a str. or strs., still to be determined, of potato virus A.

Infection experiments of ryegrass [*Lolium*] with *Gloeotinia temulenta* [**38**, 262] suggest that the incidence of blind seed disease is influenced by the level of soil fertility, the percentage of contaminated seeds being lower in samples from the more fertile plots, and probably results from the dense sward developed rather than from the level of nutrition of the plants.

Further examination of soils for the presence of *Plasmodiophora brassicae* [**37**, 192] showed that in acid soils in full summer light in the glasshouse the disease index is directly related to the number of spores in the soil when the spore load is low, but not when it is high unless temp. and soil moisture are less favourable for infection. With light intensity reduced to $\frac{1}{2}$ or $\frac{1}{4}$ that of full summer the spore load and the disease index are directly related at both low and high loads, especially at the lowest light intensity. Results obtained in summer are similar to those obtained in winter with artificially augmented light, and *vice versa*. In alkaline soils when soil temp. and moisture favour infection there is a very marked increase in the number of diseased plants and in the disease index as the spore load increases, even up to high spore loads, a direct relationship which exists even when the light intensity is very high. These results emphasize the importance of interacting factors influencing the incidence of club root; tests for the presence of *P. brassicae* should be made under standardized conditions.

Earlier experiments [cf. **19**, 284] had suggested that Bramley's Seedling apples grown in N. Ireland were more resistant externally to *Penicillium expansum* and *Botrytis cinerea* than those grown in Kent, though no differences in internal resistance to *Cytosporina ludibunda* were observed. Further experiments are now in progress to compare the resistance of the exterior of fruit from different localities to *P. expansum*. A standard inoculation method is used in which a glass tube of

1–2 mm. diam., containing spores suspended in water, is placed over a lenticel in a segment cut from the apple and embedded in paraffin wax, the tube being held in place with a mixture of beeswax, vaseline, and resin. After inoculation the segments are kept in a moist atmosphere and examined daily for 6–7 weeks. At the same time comparable inoculations are made over minute wounds on other segments.

Annual Report of the Department of Agriculture, Tanganyika, 1958 (Part II).— 33 pp., 1959.

In the section of this report [cf. **38**, 381] dealing with crops (pp. 16–33) it is stated that *Leveillula taurica* on beans [*Phaseolus vulgaris*] was a new host record for Tanganyika [cf. **30**, 510]. 'Oily pod' was again recorded on certain bean vars., notably derivatives of Idaho Refugee. No serious losses were incurred. The condition is stated to have been recorded in the Netherlands also, with no pathogenic organism involved.

Damping-off of papaw caused by *Pythium* spp. [cf. **34**, 351] and *Corticium solani* in nurseries, and root rot in the field caused by the same fungi, were responsible for heavy losses in Mbulu District. In greenhouse experiments zineb gave excellent control of damping-off without being phytotoxic. Mildew (*Ovulariopsis papayae*) [cf. **32**, 670] caused serious loss of leaves in some localities; the disease appears to be favoured by overhead irrigation in high temp. conditions.

Pea bacterial blight (*Pseudomonas pisi*) has not been recorded since 1953 [cf. **32**, 114; **34**, 351]. The outbreaks of tobacco anthracnose (*Colletotrichum tabacum*) reported in 1957 were controlled with zineb; field infections occurred sporadically throughout the season. Localized outbreaks of *P. angulata* [cf. **34**, 351] on tobacco occurred at Urambo.

Coffee rust (*Hemileia vastatrix*) [**39**, 214, 311] was again severe in the chief Arabica areas; in one experiment leaf retention was markedly increased on trees sprayed monthly with Cu oxychloride (with or without an insecticide). At least 5 applications of the conventional Cu fungicides will be required adequately to protect the new foliage against frequently recurring infections, but the economics of this are doubtful. Stem-pitting has not been reported on Robusta coffee; there was some evidence of recovery from this condition. Bark disease (*Fusarium lateritium* var. *longum*) [cf. **38**, 745] is becoming increasingly important and several deaths from this disease were reported in Rungwe District.

Cotton wilt (*F. oxysporum* f. *vasinfectum*) was again found in more localities; the disease seems to be associated with one soil type round Lake Tanganyika. Trials suggested that resistance may be present in local strains.

Gorlenko (M. V.). Краткий курс иммунитета растений к инфекционным болезням. [A short course on immunity from infectious diseases in plants.]— 249 pp., 35 fig., 5 diag., 2 maps, Moscow, State Publishers 'Soviet Science', 1959. Roubles 4.60; 6*s*. [28 ref.]

This useful manual and quick reference book treats the subject systematically under 9 main headings dealing, respectively, with plant diseases in general and infectious diseases and their causal agents (fungi, bacteria, viruses, phanerogamic parasites) in particular (pp. 7–44); immunity of plants and its role in hybridization (pp. 45–72); passive and active immunity and the principal theories of immunity (pp. 73–116); variability and specificity of the parasites and development of new races (pp. 117–140); environmental and age factors (pp. 141–155); resistance to insects and ticks (pp. 156–176); acquired immunity and other measures to increase resistance (chemical control, supply of micro-elements, use of antibiotics and bacteriophage, pruning; pp. 177–198); methods of selection and breeding of resistant vars. (pp. 199–226); methods of determining resistant vars. and organization of

work relating to the evaluation of resistance to diseases in the U.S.S.R. (pp. 227–241). An index of Latin names is appended.

Nozzolillo (C. G.) & Hochster (R. M.). **Lysis and preparation of stable 'protoplasts' of Xanthomonas phaseoli (XP8).**—*Canad. J. Microbiol.*, **5**, 5, pp. 471–478, 1 pl., 3 graphs, 1959.

A description, from the microbiol. Res. Inst., Canada Dept Agric., Ottawa, of a technique for lysing cells of *X. phaseoli* with lysozyme and penicillin, and of the formation and stabilization of 'protoplasts' in the presence of a supporting medium with the suitable addition of Mg ions.

Teliz-Ortiz (M.) & Burkholder (W. H.). **A strain of Pseudomonas fluorescens antagonistic to Pseudomonas phaseolicola and other bacterial plant pathogens.** —*Phytopathology*, **50**, 2, pp. 119–123, 1 fig., 1960.

At Cornell Univ., Ithaca, N.Y., 2 isolates of *P. fluorescens* [**39**, 271], contaminants in isolates of *Xanthomonas fuscans* from bean [*Phaseolus vulgaris*], proved antagonistic *in vitro* to 17 of 19 bacterial plant pathogens (4 gen.). *Pseudomonas fluorescens* applied to bean leaves by rubbing, spraying, or toothpick before (but not after) inoculation with *P. phaseolicola* proved an excellent protectant.

Billing (Eve), Fletcher (J. T.), Glasscock (H. H.), Elis Jones (G.), & Lelliott (R. A.). **Hosts of Erwinia amylovora (Burr.) Winslow.** -*Plant Path.*, **8**, 4, p. 152, 1959.

In 1959 the presence of *E. amylovora* [cf. **38**, 215] was confirmed on hawthorn (*Crataegus* spp.) in Kent, Surrey, the S. and S.E. suburbs of London, and at Southend-on-Sea, Essex: on whitebeam (*Sorbus aria*) in streets in Southend-on-Sea, Croydon, and the Kentish suburbs of London; on rowan (*S. aucuparia*) in Croydon; and on *Cotoneaster salicifolia* in Kent, Surrey, and central and S.E. London. It has also been noted on other species of *C.*, including *C. melanocarpa* and *C. polyanthema* in S.E. London.

S. aria, *C. melanocarpa*, and *C. polyanthema* do not appear to have been recorded previously as hosts in any country.

Cook (F. D.) & Quadling (C.). **A modified technique for isolation of bacteriophage from contaminated materials.** *Canad. J. Microbiol.*, **5**, 3, pp. 311–312, 1959.

A modification of the mass-selection technique for isolating bacteriophage from arable soils [cf. **37**, 291] is described from Canada Dept Agric., Ottawa. Mutant bacteria (*Rhizobium* spp. and *Xanthomonas phaseoli*) resistant to 2,000 μg./ml. of streptomycin were obtained by selection on a solid medium containing this antibiotic. Samples (50 g.) of field soil were enriched with a total of approximately 5×10^9 bacteria of one of the mutant strs. suspended in 5 ml. of antibiotic-containing liquid medium (500 μg. ml. streptomycin). After 16 hr. at room temp. some of the enriched soil was resuspended, centrifuged, and the supernatant assayed for phage particles on an agar medium containing the host bacterium and streptomycin (500 μg./ml.). Use of the antibiotic and resistant mutants reduced contamination which might otherwise obscure rare plaque formation on soft agar layer plates.

Cook (F. D.) & Katznelson (H.). **Isolation of bacteriophages for the detection of Corynebacterium insidiosum, agent of bacterial wilt of Alfalfa.**—*Canad. J. Microbiol.*, **6**, 1, pp. 121–125, 1 pl., 1960. [11 ref.]

Two phages for *Corynebacterium insidiosum* [**39**, 152] were isolated from roots of wilted infected lucerne plants and adherent soil by a method previously described [see above]. One phage was str. specific, the other was polyvirulent and lysed 18 of 20 strs. of this organism. One str. was resistant to both phages. The

polyvirulent phage was used successfully to detect the presence of *C. insidiosum* in roots of wilted lucerne by the rapid plaque count technique [cf. **34**, 568].

ARK (P. A.) & THOMPSON (J. P.). **Additional hosts for Tomato canker organism, Corynebacterium michiganense.**—*Plant Dis. Reptr*, **44**, 2, pp. 98–99, 2 fig., 1960.

The host range of *C. michiganense* is now reported from Univ. Calif., Berkeley, to include *Solanum muricatum* and *S. mammosum* [cf. **26**, 515].

ARK (P. A.) & THOMPSON (J. P.). **Susceptibility of Artemisia vulgaris and Helianthus tuberosus to crown gall, Agrobacterium tumefaciens.**—*Plant Dis. Reptr*, **44**, 2, pp. 102–103, 4 fig., 1960.

A. tumefaciens inoculated at Univ. Calif., Berkeley, onto *Artemisia vulgaris* and *H. tuberosus* produced rapidly growing galls, apparently new host records.

ARK (P. A.) & THOMPSON (J. P.). **A method to induce woody galls on deciduous fruit trees with Agrobacterium tumefaciens and on Olive trees with Pseudomonas savastanoi.**—*Plant Dis. Reptr*, **44**, 2, pp. 100–101, 2 fig., 1960.

To obtain galls on potted apricot and peach trees or large tomato plants, Swiss pattern round files ($5\frac{1}{2}$ or $7\frac{3}{4}$ in. long) were used at Univ. Calif., Berkeley, to file away the upper tissues until cambium was exposed. Inoculation was accomplished either by applying a heavy suspension of *A. tumefaciens* [**38**, 179] to the wounds or by using a file dipped in it. Olive trees were inoculated similarly with *P. savastanoi*.

MÜLLER-KÖGLER (E.). **Zur Isolierung und Kultur insektenpathogener Entomophthoraceen.** [On the isolation and culture of Entomophthoraceae pathogenic to insects.]—*Entomophaga*, **4**, 3, pp. 261–274, 1 fig., 1959. [Engl. summ.]

A simple and successful method for the culture of entomogenous fungi [cf. **26**, 544] is reported from the Inst. für biologische Schädlingsbekämpfung, Darmstadt, Germany, using slants of coagulated egg yolk. The medium is also suitable for maintenance of stock cultures; at room temp. these must be transferred every 3–4 weeks. Subcultures can be kept up to $1\frac{1}{2}$ (some spp. 4) months in tubes filled to 3–4 cm. with whole milk and sterilized; the fungi grow essentially in the top layer of milk fat.

The nomenclature of chemicals used in pest control.—*Rev. appl. Ent.*, Ser. A & B, **48**, 1, pp. 1–7, 1960.

A revised and expanded list giving the common name, chemical definition, and other names of 112 chemicals used in pest control, including some fungicides [cf. **35**, 31].

WIEGAND (H.) & JESKE (A.). **Anerkannte Pflanzenschutzgeräte.** [Approved plant protection equipment.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F. **13**, 12, pp. 230–235, 11 fig., 1959. [Russ., Engl. summ.]

The Biologischen Zentralanstalt Berlin der Deutschen Akademie der Landwirtschaftswissenschaften, Berlin, reports the results of tests, over the last 3 yr., of several approved appliances for spraying and dusting, and another for soil injection of fungicides [**39**, 381].

Международное совещание по вопросам карантина и защиты растений в г. Праге. [International conference on questions of quarantine and plant protection in Prague.]—Защ. Раст., Москва [*Zashch. Rast., Moskva*], **5**, 1, p. 61, 1960.

On a resolution of the IX International Conference on Quarantine and Plant Protection [cf. **39,** 51] a committee representing 8 countries was set up in

Prague in Oct. 1959 to consider the unification of quarantine regulations [cf. **37**, 213] and methods for the elaboration of procedure for forecasting disease epidemics. The committee produced 'Basic phytoquarantine regulations for the import, export, and transit of plant materials', and 'Methods of quarantine examination of plant materials in relation to pests and diseases of plants and weeds' for application in all participating countries. Methods for assessing and forecasting the occurrence and dissemination of *Phytophthora* [*infestans*] on potato and mildew [*Plasmopara viticola*] on vine were also recommended. Also considered were the co-ordination of the activities of the phytosanitary services abroad, the form of quarantine certificates, a list of quarantine diseases, and virus research.

NICOLSON (T. H.). **Mycorrhiza in the Gramineae. I. Vesicular-arbuscular endophytes, with special reference to the external phase.**—*Trans. Brit. mycol. Soc.*, **42**, 4, pp. 421–438, 2 pl. (13 fig.), 4 fig., 1959. [49 ref.]

It has been observed at the School Agric., Univ. Nottingham, that the internal phase of the vesicular-arbuscular phycomycete endophytes, which are the main infecting organisms of a range of grass spp. from different localities [cf. **32**, 688], is similar to that in other plants. The dimorphic external mycelium, often profuse, consists of thick walled aseptate permanent hyphae and thin walled regularly septate temporary hyphae. The external vesicles are either formed singly, sometimes with a rudimentary hyphal sheath, or may be like the fruit bodies of *Endogone* [cf. below], as in certain samples of sand dune grasses. Root penetration is via root hairs or epidermal cells; in the early stage of the infection cycle in samples with abundant external mycelium and numerous root hair penetrations the fungi may provide a mechanism for transfer of substances from soil to root. Other types of fungi frequently noted in grass roots were *Rhizoctonia* and fungi with brown septate hyphae, and non filamentous fungi such as *Olpidium brassicae* and *Ligniera junci*. The confusion with regard to vesicular-arbuscular mycorrhiza is partially due to the dimorphic character of the endophytes and also to the presence of other types of fungi in the roots.

MOSSE (BARBARA). **Observations on the extra-matrical mycelium of a vesicular-arbuscular endophyte.**—*Trans. Brit. mycol. Soc.*, **42**, 4, pp. 439–448, 2 pl. (6 fig.), 2 fig., 1959.

It was shown at East Malling Res. Sta., Maidstone, Kent, that the number of hyphal connexions between the extra-matrical mycelium and a vesicular arbuscular endophyte [cf. above] in mycorrhiza of apple and strawberry varied between 2·6 and 21·1 per mm. root length. The number varied according to season, environment, and manurial treatment. As yet it is not certain whether the fungus contributes to the nutrition of the associated plant; some evidence indicates that some conduction must occur in the opposite direction, as soil inoculation with *Endogone* sp. has no effect on the organic matter in the soil unless mycorrhizal infection is established on the associated plants.

DOWDING (ELEANOR S.). **Ecology of Endogone.**—*Trans. Brit. mycol. Soc.*, **42**, 4, pp. 449–457, 2 pl. (8 fig.), 3 fig., 1959. [25 ref.]

Studies at the Dept Bot., Univ. Alta, Edmonton, have shown that the vesicular-arbuscular endophyte (*Endogone* sp.) [cf. **35**, 903 and above] within the roots of at least 4 common swamp plants is also found in alpine plants and has been recorded from fossil roots. It had a more complex hyphae with thicker walls than *Pythium* and grew into the soil from root fragments, producing chlamydospores similar to the storage vesicles found in the root cortex, which are sometimes aggregated into irregular masses. *Endogone* spores are also often found in the stomachs of small animals.

Ingold (C. T.). **Jelly as a water reserve in fungi.** —*Trans. Brit. mycol. Soc.*, **42**, 4, pp. 475–478, 2 graphs, 1959.

Observations at Birkbeck Coll., Univ. London, have suggested that the rich supply of jelly in fruit bodies of *Phallus impudicus* and *Bulgaria inquinans* may serve as a water reserve for stipe elongation in the former and spore discharge in the latter.

Hagimoto (H.) & Konishi (M.). **Studies on the growth of fruit body of fungi. I. Existence of a hormone active to the growth of fruit body in Agaricus bisporus (Lange) Sing.**- *Bot. Mag., Tokyo*, **72**, 855, pp. 359-366, 7 fig., 1 graph, 1959.

At Lab. appl. Bot., Kyoto Univ., Japan, the existence of a growth hormone [**36**, 492] in *A. bisporus* was demonstrated by insertion of mica plates between the pileus flesh and gills, also by removing the gills from one side, both procedures causing curvature of the stipe. The hormone is produced in the gills and transported to the growing zone in the stipe through the pileus flesh and partial veil, apparently moving more readily in a longitudinal direction than laterally. A similar principle probably regulates growth of fruit bodies in *Coprinus* and other fungi.

Naito (N.). **Phytopathological studies concerning phytohormones with special reference to their effect on phytopathogenic fungi.**—*Mem. Fac. Agric. Kagawa Univ.* 2, 101 pp., 5 pl. (15 fig.), 1 fig., 14 graphs, 1957. [Jap. Engl. summ. (10 pp.). 190 ref. Received Jan. 1960.]

This publication is in the main a summary of the author's researches, much of which has been noticed [**39**, 88 *et passim*], and deals principally with the effect of 2,4-D on phytopathogenic fungi, particularly *Gloeosporium olivarum*.

Tagüeña (M.). **Estudio comparado de la acción de varias radiaciones y de los ultrasonidos sobre las esporas de Rhizopus nigricans.** [Comparative study of various radiations and ultrasonic vibrations on *R. stolonifer* spores.]—*Ciencias, Méx.*, **19**, 8–10, pp. 189–196, 2 graphs, 1959. [Engl. summ.]

Alpha particles harmed all spores and caused numerous deformations. Ultraviolet rays delayed growth to varying degrees without morphological effect, while ultrasound sometimes checked germination but had no effect on subsequent development [cf. **38**, 70, 704].

Agarwal (G. P.). **Sulphur and phosphorus nutrition of two strains of Fusarium coeruleum (Lib.) Sacc.** *Phyton*, **8**, 1, pp. 43–51, 1957. [Span. summ.]

The 2 strains of *F. caeruleum* [**38**, 729] used in these studies at Coll. Agric., Nagpur, India, were isolated from potato and *Colocasia antiquorum*. Both strs. were able to make some growth on media lacking S or P.

Kole (A. P.) & Horstra (K.). **Electron microscope observations on the flagella of the zoospores of Phytophthora infestans.**—*Proc. Acad. Sci. Amst.*, Ser. C, **62**, 4, pp. 404–408, 9 fig., 1959.

By means of a phase-contrast microscope paddle-like structures were observed on the flagella of swimming zoospores of *P. infestans* [cf. **34**, 391; **37**, 144]. Electron microscope observations suggest that these structures are protrusions of the sheath of the flagellum. The hairs of the tinsel-type flagellum consist of 2 parts, a basal part covering $\frac{3}{4}$ of its total length and a thin end-piece. The flagellum consist of 11 strands enveloped in a sheath. As in similar flagella [**32**, 438] there are presumably 2 central strands surrounded by 9 others.

Krasil'nikov (N. A.). Микроорганизмы почвы и высшие растения. [Soil microorganisms and higher plants.]– 463 pp., 170 fig., 16 graphs, 5 diag., Moscow,

Microbiological Institute, Acad. Sci. U.S.S.R., 1958. Roubles 24.50; 30*s*. [39 pp. ref.]

'Micro-organism' as used in this book covers protozoa, schizophyceae, actinomycetes, bacteria, myxobacteria, spirochaetae, and phages, but not fungi. Ample material is divided into 4 parts, of which the 1st (pp. 9–136) deals with the morphology and physiology of bacteria, including a chapt. on the variability of micro-organisms (pp. 111–136); the 2nd (pp. 137–213) discusses physical aspects of soil and the distribution of micro-organisms; the 3rd (pp. 214–274) is devoted to biological factors of soil productivity and the problems of plant nutrition, in particular the role played by biotic substances; the 4th (pp. 275–422) deals with the influences of plants and soil micro-organisms on one another (pp. 275–352), soil toxicity (pp. 352–366), and microbial antagonism (pp. 366–417), and concludes with a survey of epiphytic microflora (pp. 418–422).

PESTINSKAYA (Mme T. V.). О взаимоотношениях грибов обитающих в почве. [Concerning the interrelations of soil fungi.]—*Bot. Zh. S.S.S.R.*, **43**, 9, pp. 1270–1277, 1958.

In further research on fungal antagonism [cf. **39**, 157] at Pan-Union Inst. of Plant Protection, Leningrad, *Fusarium avenaceum* var. *herbarum* causing root rot of clover [**37**, 496], sprout and spike diseases of cereals, and wilting of potato [**38**, 540] was tested against 114 isolates of saprophytic fungi (52 spp.). Inoculated on nutrient agar plates with *F.a.* var. *herbarum* 5·3% had no effect; 17·6% showed 'alimentary' antagonism, i.e. used up nutrients in such a measure as to slow down the growth of *F.a.* var. *herbarum*; 64% showed 'territorial' antagonism, i.e. checked the growth on contact; 7% showed 'antibiotic' antagonism; and 6·1% were parasitic, disintegrating the colony. The influence of *F.a.* var. *herbarum* on the saprophyte, which notably levelled these reactions in culture, is of little importance in the field where the saprophytes are in the vast majority.

If culture filtrates with spores were mixed with nutrient agar at 1:2 cu. units and inoculated with *F.a.* var. *herbarum*, the colonies developing from spores also displayed differential antagonism: 'alimentary' with *Trichoderma lignorum* [*T. viride*], 'territorial' with *Gliocladium salmonicolor*, and 'antibiotic' with *Penicillium* sp.

Botrytis densa developed fully and yielded spores in abundance, but completely prevented sporulation of *F.a.* var. *herbarum* and caused it to disintegrate.

SEWELL (G. W. F.). **Studies of fungi in a Calluna-heathland soil. I. Vertical distribution in soil and on root surfaces. II. By the complementary use of several isolation methods.**—*Trans. Brit. mycol. Soc.*, **42**, 3, pp. 343–353, 3 graphs; pp. 354–369, 2 graphs, 1959.

Soil samples were collected from Burnt Hill, Chobham Common, Surrey, from exposed profiles of a sandy podsol at every inch to a depth of 6 in. and then every 3rd inch down to 30 in. by scraping away the surface with a sterilized spatula and pushing sterilized glass tubes horizontally into the soil face. The soil was plated out (at Royal Holloway Coll., Univ. London) on 3 types of media and incubated at room temp. [cf. **35**, 34, 326]. No seasonal variation in the occurrence of fungi was apparent; the total number of spp. decreased with depth, but *Mucor ramannianus*, *Trichobotrys* sp., and a sterile phycomycete mycelium (F 37) were common in the A_2 and B_1 horizons and the sterile mycelium DS 85 was most frequent in B_2 and C. Distribution on the *Calluna* root surfaces was related to the soil horizon rather than to root type. A few characteristic spp. were of constant occurrence, and a very stable fungus population was found in the immediate subsurface horizon. The deeper, illuviated horizons and parent subsoil contained few fungi, of which the commonest were dark-coloured, non-sporing mycelia.

The A_1 horizon of the same soil was studied by the soil plate, immersion tube [**28**, 240], and slide trap methods [**35**, 548]. A marked seasonal variation in the activity of *Trichoderma viride* was demonstrated by the 2 latter (direct) methods. The isolation method and medium, time, position and depth of sampling, and interaction between these factors differentially affected the results. The soil plate method favoured the isolation of heavily sporing fungi, particularly *Penicillium* spp., and the direct methods emphasized the importance of rapidly growing fungi, notably *Mortierella* spp., which may have been stimulated by a physical 'rhizosphere' effect produced by the immersion of solid objects in the soil. Competition between spp. was a major factor in determining results obtained by all methods. Even with the combined use of the several methods a proportion of the fungus flora consisting largely of humus inhabiting fungi was unavailable for study.

James (N.). **Plate counts of bacteria and fungi in a saline soil.**—*Canad. J. Microbiol.*, **5**, 5, pp. 431–439, 1 pl., 1959.

At Dept Microbiol., Univ. Man., Winnipeg, the number of fungi and bacteria isolated from saline soil was ⅕ of that from a Red River clay soil, the bacterial counts on soil-extract agar media being higher for both soils than on synthetic media. Similarly, fungal counts on either medium with 0·02% K_2HPO_4, 0·1% glucose, and 0·1% peptone were higher than those on a number of standard synthetic media, and the same held on a medium with these 3 chemicals but lacking the soil extract. The counts for fungi or bacteria varied inversely with the amount of potassium phosphate, or alternatively sodium phosphate, present in the medium.

Peterson (E. A.). **Seed-borne fungi in relation to colonization of roots.**—*Canad. J. Microbiol.*, **5**, 6, pp. 579–582, 1959.

At the microbiol. Res. Inst., Canada Dept Agric., Ottawa, the fungi associated with barley, flax, and wheat seeds [cf. **37**, 762] played little part in the colonization of roots of non-sterilized seeds planted in natural soil and examined 2 days later and at short intervals thereafter for 3 weeks. *Aspergillus*, *Penicillium*, and *Alternaria* spp., abundant on the seed, were rarely found on young roots, which were relatively free from fungi at 2 days, *Pythium* and *Fusarium* being predominant when infection did occur. In subsequent samples the incidence of *P.* declined markedly, while spp. of *F.*, *Phoma*, *Pullularia*, *Periconia*, and *Cylindrocarpon* were predominant, *C.* assuming greater prominence on wheat than on either barley or flax. Soil is apparently the primary source of fungi colonizing the roots of healthy plants.

Smith (J. G.). **The influence of antagonistic fungi on Thielaviopsis basicola (Berk. et Br.) Ferraris.**—*Acta bot. neerl.*, **9**, 1, pp. 59–118, 2 graphs, 1960. [101 ref.]

At the phytopath. Lab. 'Willie Commelin Scholten', Baarn, Netherlands, *T. basicola* was found to be common in local garden soil and was isolated from the roots of *Primula obconica* and *Nicotiana glutinosa*. The latter, very susceptible to black root rot caused by this fungus [**30**, 200], was chosen as an indicator to assess the effects of fungal antagonists in the soil. Of many soil fungi isolated, 38 displayed antagonism to *T. basicola* on cherry agar, about 20% of them markedly. The most active filtrates from cherry juice cultures were of *Aspergillus fumigatus*, *Penicillium expansum*, *P. spinulosum*, *P. spiculisporum*, and *P. roquefortii*. Activity was markedly influenced by the medium, more active filtrates being obtained from Czapek-Dox than from cherry juice or potato extract media. In Czapek-Dox the C source was of some importance, saccharose giving the most active filtrate from *P. roquefortii* (5% being better than 1%), while with *P. spiculisporum* glucose and maltose were best. Corn steep liquor was inhibitory to antibiotic formation. The inhibitors in the filtrates, excepting those produced by *A. fumigatus*, could with-

stand 103° C. for 10 min., while at room temp. they remained active for 45 days. Antibiotic production by *P. roquefortii* occurred mainly during the 1st 15 days' culture, when growth was active. *P. roquefortii* strs. differed in the activity of their filtrates, but *T. basicola* strs. were equally susceptible to the filtrates.

In a soil in which diseased *P. obconica* had grown, the pathogen was not demonstrable by plate culture at the outset of the experiment, but its presence was indicated by the infection of primulas in it. The composition of the fungal populations in these soils was unaffected by periodic inoculation (every other day, 4–22 Mar.) with a spore suspension of *T. basicola*. During the first 6 days the numbers of *T.* colonies remained high, but then there was a sharp drop, greater in 'diseased' soil, in which the microflora was more abundant, than in 'healthy' soil (in which primulas remained healthy). At the end of the experiment, when the soils were planted with *P. obconica*, heavier infections developed in 'healthy' soil which had received the periodic inoculations. This finding was in keeping with the above observation of the more rapid decrease of *T. basicola* in the 'diseased' soil.

There was little or no correlation between the degree of root infection of *N. glutinosa* by *T. basicola* and external conditions, but infected plants grown in direct sunlight were nearly dead at the end of the experiment, while those in the shade were still in fairly good condition, though less vigorous. The amount of inoculum required for a severe infection of *N. glutinosa* was 3,000–5,000 infection units (chlamydospores or conidia) cc. soil. In sterilized soil at 25° C., a high R.H., and shade, conditions opt. for growth of *N. glutinosa* and for assessment of symptoms, infection was inhibited to some extent by *P. expansum*, *P. spiculisporum*, or *P. spinulosum*, when inoculated simultaneously with *T. basicola*, but not by *A. fumigatus*. In unsterilized soil the inhibition exerted by the normal microflora was far greater than that exerted by the 3 *P.* spp. in sterilized soil, though these were the most active of all antagonists tested, both in soil and *in vitro*.

ANDERSON (KATHLEEN J.). **The effect of soil micro-organisms on the plant-rhizobia association.** *Phyton*, **8**, 1, pp. 59–73, 1 graph, 1957. [Span. summ.]

Of 25 bacteria and 17 fungi examined at agric. Bot. Dept, Univ. Durham, Newcastle-on-Tyne, for their effect on 4 strs. (36, 157, 284, and 297) of *Rhizobium trifolii* [cf. **32**, 695] in white clover in agar culture, 14 were harmful to the association and 8 beneficial, but there was no correlation between these organisms and those which were antagonistic to rhizobia in culture without clover. Those which caused poorer plant growth either inhibited nodulation completely or delayed it: extracts of organisms which helped plant growth were more effective than the organisms themselves. Multiplication of rhizobia in soil was inhibited by a fungus only in the presence of clover plants. *Aspergillus flavus* and *Nocardia asteroides* caused increase in plant weight with rhizobial strs. 36 and 284.

ROBINSON (J. B.) & CORKE (C. T.). **Preliminary studies on the distribution of actinophages in soil.** —*Canad. J. Microbiol.*, **5**, 5, pp. 479–484, 1 pl., 2 graphs, 1959.

A description is given of the perfusion technique used at Dept Microbiol., Ont. agric. College, Guelph, for isolating from the soil actinophages active against *Streptomyces scabies* [**38**, 497], used as a test organism.

DOMASHOVA (Mme A. A.). Ржавчинные грибы **(Uredinales)** хребта Терскей-Алатау Киргизской ССР. [Rust fungi (Uredinales) of the Terskei-Alatoo range in Kirgiz S.S.R.]—*Bot. Zh. S.S.S.R.*, **44**, 1, pp. 74–79, 1959. [18 ref.]

A survey from the Komarov bot. Inst., Leningrad, of 126 spp. (9 gen.) according to the type of life-cycle and the zones of occurrence (litoral flatland, forest, sub-alpine, alpine) [**39**, 158]. Of cereal rusts the most harmful were yellow rust (*Puccinia*

glumarum) [*P. striiformis*: cf. **38**, 732], which reduced yield of winter wheat by up to 50% in some vars.; brown wheat rust (*P. triticina*) [*P. recondita*: cf. **38**, 738], which spread particularly in the west districts in hot summers; and *P. graminis* [**37**, 296] and *P. coronifera* [*P. coronata*; **37**, 295], found chiefly on cereal fodders.

SHOEMAKER (R. A.). **Nomenclature of Drechslera and Bipolaris, Grass parasites segregated from Helminthosporium.**—*Canad. J. Bot.*, **37**, 5, pp. 879–887, 1959.

The author adopts the variant spelling *Helmisporium*, used by Gray in 1821, in preference to the later *Helminthosporium*, and restricts the use of this generic name to the type species *H. velutinum* and related lignicolous spp. producing conidia both apically and laterally. Of the graminicolous spp. (conidia produced apically only), 16 with cylindric conidia germinating from any cell are gathered into *Drechslera* [**10**, 233] (type sp. *D. tritici-vulgaris*); 38 with fusoid conidia germinating at the two ends only are put in a new genus *Bipolaris* (type sp. *B. maydis* [*Cochliobolus heterostrophus*]). The necessary new combinations are made. The author also accepts *Vakrabeoja* (Subramanian, *J. Indian bot. Soc.*, **35**, p. 466, 1956) as the correct genus for *Helminthosporium sigmoideum*, the condial state of *Leptosphaeria* [*salvinii*].

McKAY (HAZEL). **Cultural basis for maintaining Polyporus cinnabarinus and P. sanguineus as two distinct species.**—*Mycologia*, **51**, 3, pp. 465–473, 2 fig., 1959. [13 ref.]

In paired culture tests at Beltsville, Md. with single-spore isolates from sporophores of *P.* [*Polystictus*] *cinnabarinus* and *P.* [*Polystictus*] *sanguineus* [cf. **32**, 157; **35**, 792] from 11 different localities in the U.S.A., from 2 in Argentina, and 1 in the Virgin Islands, the isolates fell into 2 groups, clamp connexions being formed only within and not between groups. All those in one group came from sporophores of *P. sanguineus* and those of the other from *P. cinnabarinus*, the sporophores conforming in appearance with Overholt's description [cf. **33**, 450]. The evidence thus suggests they are different species.

KEMP (R. F. O.) & BEVAN (E. A.). **New techniques for isolating spores of hymenomycetes.**—*Trans. Brit. mycol. Soc.*, **42**, 3, pp. 308–311, 2 fig., 1959.

In a technique for isolating basidiospore tetrads [cf. **30**, 115], described from the Bot. School, Univ. Oxford, a square (A) with 1·5 cm. sides and several (B) 0·75 cm. are cut from an agar plate 0·4 cm. deep; a cross just penetrating the surface is made on each of the smaller blocks. Two blocks are mounted on a slide under the microscope; a whole gill or a section of hymenial surface is placed at an angle of 45° on block A, and a tetrad is transferred with a microloop to block B. The spores are then picked up individually with the microloop and each is deposited in the centre of one of the smaller squares, which are separated and transferred to agar slants.

For isolating oidia, random basidiospores, or mycelial tips an area 1 × 2 cm. is marked out towards one side of an agar plate and smeared with spores or hyphal tips. The remaining medium is cut obliquely into 4 V-shaped strips (0·5 cm. surface width) and these are cut across into sections 0·5 cm. long. The dish is mounted on the microscope stage, and the loop manipulated so that a spore or a hyphal tip is isolated within it. The isolate is transferred onto the centre of a V-shaped block, which can then be mounted on an agar slant.

HOPKINS (J. C.). **A spore trap of the vaseline slide type.**—*Canad. J. Bot.*, **37**, 6, pp. 1277–1278, 2 fig., 1959.

This trap, described from For. Biol. Div. Canada Dept Agric., Ottawa, was used to study spore release by *Atropellis piniphila* on pine [cf. **38**, 344] and included a trough to catch water from a vaselined slide. The slide was attached to a piece

of Al sheet folded over a wire at one end for attachment to the tree, and bent into a trough at the bottom. One end of the trough was sealed, the other discharged into an attached tube or bottle. The suspension in the trough is washed into the bottle, and spores on the coated slide are brought into suspension by heating under water. The total count of spores was obtained with a haemocytometer.

O'Connell (D. C.), Wiggin (N. J. B.), & Pike (G. F.). **New technique for the collection and isolation of airborne microorganisms.** –*Science*, **131**, 3397, pp. 359–360, 1 fig., 1960.

The materials needed for this method, devised at the Defence Res. Kingston Lab., Ontario, are 2-in. lengths of plastic rod or tube, a wire holder, and a charging sleeve, all sealed sterile into a package. At the site the rod is rubbed 5 or 6 times with the charging material, held for 5 sec.–2 min. in the air, and then rolled over the dry surface of an agar plate. The number of aerial organisms secured totalled about 75% of that obtained by the impinger technique.

Bawden (F. C.) & Pirie (N. W.). **The infectivity and inactivation of nucleic acid preparations from Tobacco mosaic virus.**—*J. gen. Microbiol.*, **21**, 2, pp. 438–456, 1959. [33 ref.]

At Rothamsted exp. Sta. susceptibility to nucleic acid preparations of tobacco mosaic virus as compared to the intact virus was increased if the test plants (*Nicotiana glutinosa*) were kept in the dark or at 37° C. before inoculation [**39**, 42]. The differences in susceptibility of leaves in different physiological states were too big to be explained by the differences in the ability of leaf extracts to inactivate nucleic acid preparations *in vitro*; such inactivation was not prevented by inhibitors of ribonucleases, while its rate was increased by most additions to the preparations. Not all the inactivations were readily explicable on the assumption that the min. infective unit is a pure nucleic acid built up solely from nucleotides. Leaf sap and saliva [cf. **37**, 631] are assumed to inactivate because they contain ribonuclease; inactivations by formaldehyde phenylglyoxal and thiaminase in the presence of thiamine may reflect reactions with known components of nucleic acids. However, inactivations by spermine, 'interferon' (Isaacs *et al.*, *Proc. Roy. Soc.*, B, **147**, p. 258, 1957), some oxidising agents, leaf mitochondria [cf. **36**, 813] in the presence of some other substances, and the greater rate of inactivation *in vacuo* than in air are more difficult to explain. Although nucleic acid seems essential for infectivity the precise chemical identity of the min. infective unit is still uncertain.

Hollings (M.). **Nicotiana clevelandii Gray as a test plant for plant viruses.** –*Plant Path.*, **8**, 4, pp. 133–137, 1 pl., 1959.

In mechanical inoculation tests at the Plant Path. Lab., Harpenden, *N. clevelandii* was susceptible to 41 of 58 plant viruses used. Symptoms are described. The plant proved to be a useful indicator for certain viruses, and a good source for many more, including several (broad bean mottle, pea mosaic, lettuce mosaic, and a narcissus virus) for which no other Solanaceous host has been found. Sap from *N. clevelandii* is easily clarified and suitable for serological studies.

Costa (A. S.) & Carvalho (Ana M.). **Mechanical transmission of the Abutilon mosaic virus.**—*Phytopath. Z.*, **37**, 3, pp. 259–272, 4 fig., 1960. [Germ. summ.]

Abutilon mosaic [Abutilon infectious variegation] virus from weeds (*Sida* spp.) was transmitted by carborundum rubbing at the Inst. Agronomico, Campinas, Brazil [**35**, 184; cf. **38**, 733], when *Malva parviflora* seedlings were used as test plants. Two other *Malva* seed sources, probably *M. rotundifolia*, were also

susceptible to mechanical inoculation but less so than the former sp. No mechanical transmission direct from leaves of *Abutilon striatum* var. *thompsonii* was secured but after transference to *S. micrantha* by grafting results were positive from this host. *S. rhombifolia*, *S. micrantha*, cotton (*Gossypium hirsutum*), and several other spp. easily infected by the vector (*Bemisia tabaci*) were highly resistant to mechanical transmission. *S. micrantha*, *S. rhombifolia*, and *M. parviflora* were good sources of inoculum, which was more effective when taken from young leaves with severe yellow mosaic symptoms. *Nicandra physaloides*, tomato, *Datura stramonium*, and some infected legume plants generally gave inoculum of low activity. The virus remained active in infective sap for 24 hr. at room temp., and for 48 hr. when treated with buffer + sodium sulphite. Dilution 1:25 produced infection and in 2 tests some activity was present at 1:625. Most activity was lost in inoculum heated at 50° C. for 10 min., but was not completely lost at 55°.

Köhler (E.). **Über die durch Virusinfektion verursachten Reizzonen an den Blättern von Gomphrena globosa.** [On the 'zones of stimulation' produced by virus infection in leaves of *G. globosa*.]—*NachrBl. dtsch. PflSchDienst, Stuttgart*, **11**, 12, pp. 187–188, 1 fig., 1959.

From the Biologischen Bundesanstalt für Land- und Forstwirtschaft, Brunswick [cf. **37**, 598], the author describes a dark green zone sometimes to be seen round foci of infection of potato virus X in *G. globosa* when detached leaves, after inoculation, are kept under continuous light in moist Petri dishes; in effect the zones retain the original green colour, which is lost by the remaining leaf tissue. Generally, the longer the leaf takes to turn pale the larger will be the green zone. Transmission experiments on the 4th day after inoculation revealed abundant virus in the central pale fleck, i.e. the focus of infection, but none in the surrounding green zone.

Ponchet (J.) & Auge (G.). **Essais de traitement de la fonte des semis de céréales.** [Attempts at control of damping-off of cereal seedlings.]—*Phytiatrie-Phytopharm.*, **8**, 3, pp. 141–149, 1959.

Damping-off of cereals, caused in the main by *Septoria nodorum* and *Fusarium nivale* [*Calonectria nivalis*], is of growing importance in France [cf. **38**, 126]. Of numerous fungicides tested in the laboratory and in the field at the Station de pathologie végétale, Versailles, organic mercurials and other organic fungicides (including Cu oxinate [Cu-8-quinolinolate], thiram, and dichlone) gave protection, the latter group being less affected by environmental conditions, and so more reliable. Inorganic Cu products, with the exception of the sulphate and the oxychloride, showed little activity. Benzene derivatives were ineffective.

Geshele (É.) & Savitskaya (Mme V.). Сортоустойчивость и улучшение семеноводства в борьбе с головней. [Varietal resistance and improvement in seed-growing for smut control.]—Сел. Хоз. Сибири [*Sel. Khoz. Sibiri*], **5**, 2, pp. 23–25, 1960.

This further report from the Siberian sci. Res. Inst. for Agric. [cf. **39**, 298] gives the figures for infection by loose smut [*Ustilago nuda*: **38**, 507; **39**, 18] in the Kemerovskaya region in 1958 as 65% on spring wheat and 6% on barley. There was 20% infection by loose smut of oats [*U. avenae*]. Promising wheat vars. from the State var. list for Siberian conditions are Slavgorodskaya 6, Bezenchukskaya 98, and Skala. Barleys with the highest resistance to *U. nuda* and stinking smut [*Tilletia* spp.] are Omskiĭ 13,709, and Europeum 358/133, which is more susceptible. From data on av. loose and covered smut infection for regional cereal vars. in the Omsk region in 1958, infection by *U. nuda* on the spring wheats Lutescens 758 was 0·008%, Tarskaya 2 10%, and Albidum 3700 0·11%. Caesium 94, reputed to have high resistance to *U. nuda*, was 0·48% infected.

SALAZAR (J.). **Razas fisiológicas de Puccinia graminis tritici Eriks. et Henn., en España, en 1958.** [Physiologic races of *P.g. tritici* in Spain in 1958.]—*Bol. Inst. Invest. agron., Madr.*, **19**, 41, pp. 349–362, 1 graph, 1 map, 1959.

The races identified on wheat samples from different parts of Spain [**34**, 356] during 1958 were 14 (19·5%), 16 (1·2%), 17 (18·07%), 19 (3·6%), 21 (43·37%), 24 (7·23%), and 75 (7·23%). In collaboration with the Estação de Melhoramento de Plantas, Elvas, Portugal [**39**, 162], it was established that races 21, 17, 14, 186, 34, and 116 overwintered in both countries.

Race 14, which predominated in 1947–49, is now much less frequently encountered, while race 21 is now predominant.

TULLOCH (A. P.), CRAIG (B. M.), & LEDINGHAM (G. A.). **The oil of Wheat stem rust uredospores. II. The isolation of *cis*-9,10-epoxyoctadecanoic acid, and the fatty acid composition of the oil.**—*Canad. J. Microbiol.*, **5**, 5, pp. 485–491, 1 graph, 1959. [20 ref.]

In further studies of *Puccinia graminis* at the Prairie Regional Lab., Saskatoon [cf. **38**, 76], the above chemical, not previously found in natural fats, was present as a glyceride.

SILVERMAN (W.). **A toxin extracted from Marquis Wheat infected by race 38 of the stem rust fungus.**—*Phytopathology*, **50**, 2, pp. 130–136, 3 fig., 1960.

A more detailed account of studies on *Puccinia graminis* already noticed [**39**, 403].

DEKAPRELEVICH (L. L.) & NASKIDASHVILI (P. P.). К методике селекции озимой Пшеницы на иммунитет к ржавчинным заболеваниям. [On methods of selecting winter Wheat for immunity from rusts.]—*Sel. Seed-Gr., Moscow*, **25**, 1, pp. 42–44, 1960.

In hybridization work since 1953 at the Mukhran teaching farm, Georgian agric. Inst., 3 local soft wheat vars. susceptible to rust were employed in 17 crosses: Dolis-Puri kartalinskiĭ (a forest-steppe ecotype) liable to heavy yellow rust [*Puccinia striiformis*: **39**, 16] infection (65–100%) at the milk stage, but less susceptible than the other vars. at maturity; Dolis-Puri tianetskiĭ (forest ecotype), susceptible under Kartli conditions (even 100% until earing); and Dolis-Puri kahetinskiĭ, which is also frequently susceptible in Kartli in the tillering stage. The F_3 and F_4 from Klein 33 / Dolis-Puri kartalinskiĭ were free from *P. striiformis*; those from Dolis-Puri kartalinskiĭ × Kitaĭskaya K-VIR-28706 were 10% infected. The most resistant were the progeny from Klein 33 (female parent) × Dolis-Puri kartalinskiĭ type hybrid (Dolis-Puri 35–4) as the male parent. Of the 41 families from this cross taken to the 7th generation 29 were completely resistant to *P. striiformis* and brown rust [*P. recondita*: loc. cit.] in 1958, the remainder being only 5–10% infected. It is concluded that the female parent should have the highest possible resistance to rust.

SAMBORSKI (D. J.) & OSTAPYK (W.). **Expression of leaf rust resistance in Selkirk and Exchange Wheats at different stages of plant development.**—*Canad. J. Bot.*, **37**, 6, pp. 1153–1155, 1959.

Greenhouse experiments at the Plant Path. Lab., Canada Dept Agric. Res. Sta., Winnipeg, Man., using pure races of leaf rust [*Puccinia recondita*] indicated that the unexpectedly heavy infection of mature field-grown resistant wheat vars. Selkirk and Exchange was due to partial breakdown of both seedling and adult plant resistance when the plants were approaching maturity. The change would not affect yields but could exaggerate estimates of rust damage which should be taken in rust nurseries, at least on these vars., before the plants are ripe.

Nyquist (W. E.). **Heterogeneity in the Norka differential Wheat variety to a new race of Erysiphe graminis tritici.**—*Plant Dis. Reptr*, **44**, 2, pp. 126–128, 1960.

Observations at Univ. Calif., Davis, indicated that var. Norka contains 2 morphologically indistinguishable types, 1 resistant and 1 susceptible to a new race of *E. graminis* [cf. **36**, 755 *et passim*], the pathogenic reaction of which is described and which differs from races 3 [**26**, 386] and Arg. 3 in the reaction on Norka.

Defosse (L.). **Comportement de plantules de Froment infectées par Ophiobolus graminis Sacc. sur quelques milieux nutritifs.** [The behaviour of Wheat seedlings infected by *O. graminis* on some nutrient media.]—*Parasitica*, **15**, 4, pp. 171–179, 1959.

At Sta. de Phytopathologie, Gembloux, Belgium, the development of foot rot and scald (*O. graminis*) [cf. **37**, 276] in inoculated wheat seedlings was unaffected by N nutrition [cf. **17**, 512], though growth of diseased seedlings varied with N level in the same way as that of healthy plants. Excess or lack of C had no effect on the disease. Infected seedlings growing in sand enriched with nutrients developed more roots than healthy plants in the same medium, but some of the new roots of the former became infected. In a non-aerated liquid medium, root formation by infected plants was accelerated during the 1st few days after transfer, then declined and equalled that of healthy seedlings.

Hoffmann (W.) & Nover (Ilse). **Ausgangsmaterial für die Züchtung mehltauresistenter Gersten.** [Source material for breeding for mildew resistance in Barley.]—*Z. Pflanzenz.*, **42**, 1, pp. 68–78, 1959. [Engl. summ.]

Resistance to *Erysiphe graminis* in the barley vars. now cultivated in Germany [cf. **36**, 313] depends on only a few genetic factors and is limited to individual races, hence the rapid spread of races able to overcome this partial resistance. Future breeding for resistance will be founded on the widest possible genetic basis. Useful initial material [cf. **35**, 760] has been found in summer barley from Abyssinia and India, summer and winter barley from the Balkans, winter barley from Anatolia, and mutants obtained by irradiation of breeders' vars. [cf. **38**, 78].

Luke (H. H.), Morey (D. D.), & Hadden (S. J.). **Hosts for differentiating Oat loose-smut races of the Southeastern United States.**—*Phytopathology*, **50**, 3, pp. 209–212, 1960.

In combined studies by U.S. Dept Agric.; Fla agric. Exp. Sta., Gainesville; Ga Coastal Plain Exp. Sta, Tifton; and Coker's Pedigree Seed Co., Hartsville, S. Carol., dehulled seed (the most satisfactory) was inoculated with *Ustilago avenae* (100 mg. chlamydospores/50 or 100 seeds) before sowing. From 50 vars. and lines of oats tested, 10 were selected which effectively differentiated 4 collections of the smut, 2 of which may represent new races [cf. **34**, 446]. In addition the races A 14 and A 15 were also differentiated.

Fedorinchik (N. S.). Обработка семян триходермин-3. [Seed treatment with trichodermin-3.]—Кукуруза [*Kukuruza*], **5**, 1, pp. 50–51, 1960.

In further tests [cf. **39**, 281] at the Pushkin base, All-Union Inst. for Plant Protection, the effectiveness of the preparation was tested against maize diseases. On dry seed it increased yield by 11·4%. In these experiments $\frac{2}{3}$ of the damage was caused by wireworm and $\frac{1}{3}$ by *Fusarium* infection.

Al-Sohaily (I. A.) & Mankin (C. J.). **Reaction of Corn and Sorghum to Corn and Sudan grass head smuts.**—*Plant Dis. Reptr*, **44**, 2, pp. 113–114, 2 fig., 1960.

In experiments at S. Dak. agric. Exp. Sta., Brookings, *Sphacelotheca reiliana* collected from maize [cf. **38**, 140] and injected into seedlings of sweet corn and

grain sorghum infected the former, but failed to infect the latter, while *S. reiliana* from sorghum [**36**, 315] infected both maize and sorghum. It is thus inferred that head smutted sorghum may be a source of inoculum for head smut on some maize vars.

World catalogue of genetic stocks, Rice, Suppl. 7, 12 pp.; **Wheat, Suppl. 7,** 20 pp., F.A.O. publs., 1959. [Engl. Fr., Span. introductions.]

The tabulated data, from India, Iraq, Madagascar, Malaya and the Philippines on rice, and from Canada, Germany, Italy, Jordan, Morocco, New Zealand, Pakistan, United Kingdom, and U.S.A. on wheat, includes the resistance of each genetic stock to the commoner diseases of the crop.

Nuove razze di Riso. [New Rice vars.] -*Progr. agric.*, **5**, 12, pp. 1414–1415, 1 col. pl., 1959; **6**, 1, pp. 106–107, 1 col. pl., 1960.

Lomello and Roverbella are highly resistant to foot rot (*Fusarium* sp.) [*Gibberella fujikuroi*: **36**, 724, *et passim*], slightly to collar rot (*Piricularia* sp.) [*P. oryzae*], and moderately to basal necrosis of the culm (*Sclerotium* sp.) [*Leptosphaeria salvinii*: **33**, 445]; they are, respectively, moderately and slightly resistant to 'brusone' (*Helminthosporium* sp. [*Ophiobolus miyabeanus*] and *P.* [*oryzae*]) [**1**, 343; **27**, 355; **31**, 456; **36**, 723, *et passim*].

Olcenengo, developed at the Staz. sper. Risicoltura, Vercelli, Italy, possesses average resistance to 'brusone' and collar rot; 'Olmo', from the Soc. Produttori Sementi, Bologna, high resistance to both.

Galvez (G. E.), Jennings (P. R.), & Thurston (H. D.). **Transmission studies of hoja blanca of Rice in Colombia.** *Plant Dis. Reptr*, **44**, 2, pp. 80–81, 1960.

Experiments for the Colombian Min. Agric. showed that the virus hoja blanca [**37**, 658] was transmitted by nymphs and adult males and females of the leafhopper *Sogata orizicola* [**38**, 516] (though only about 9% of the natural population of the vector was capable of transmission), but not through the soil, by seed, or mechanically.

Bernaux (P.). **L'épidémie de piriculariose du Riz en France en 1959.** [The epidemic of Rice blast in France in 1959.]—Reprinted from *Bull. Rizic. Fr.* 63, 8 pp., 7 fig., 1 diag., 1 graph, 1959. [13 ref.]

An account of the outbreak of *Piricularia oryzae* on rice in the Camargue [mouth of the Rhone] in 1959 which, under very favourable meteorological conditions, reached epidemic proportions [cf. **36**, 349].

Minz (G.) & Palti (J.). **Long smut of Sorghum in Israel.**—*Plant Dis. Reptr*, **44**, 2, pp. 147–148, 1 fig., 1960.

As reported from Beit Dagan-Rehovot agric. Res. Sta. the recently introduced Leoti and dwarf sorghum vars., though less susceptible to kernel smut (*Sphacelotheca sorghi*) and head smut (*S. reiliana*), were found to succumb to long smut (*Tolyposporium ehrenbergii*) [cf. **37**, 475, 584]. The world distribution of *T. ehrenbergii* is noted, and its distribution in Israel; it is confined to the E. hemisphere.

Agarwal (G. P.). **Nutritional studies on Curvularia penniseti. I. Influence of nutrient media, pH, temperature and carbon nitrogen ratio.**—*Phyton*, **10**, 1, pp. 77–87, 1958. [33 ref. Span. summ.]

In further work at the Bot. Dept, Jabalpur, India, *C. penniseti* from *Pennisetum typhoides* [cf. **38**, 367], cultured on Asthana-Hawker's medium A, grew between pH 2·8 and 10 (opt. 3·6–8·4) and sporulated well at 4·4–7·8; the final reaction of the

medium was towards alkalinity. The opt. temp. for growth and sporulation was 28° C. The opt. C/N ratio was 16:1 g./l. though growth and sporulation were quite good at 0·1:0·025.

Dovnar-Zapol'skiĭ (D. P.). Вирусные болезни Цитрусовых и карантин. [Virus diseases of Citrus and quarantine.]—Защ. Раст., Москва [*Zashch. Rast., Moskva*], **5**, 1, pp. 46–47, 1960.

In this brief review of the foreign literature attention is drawn to the absence of data on citrus virus diseases in the U.S.S.R., apart from citrus psorosis virus [cf. **36**, 25]. The latter is seed transmissible, no insect vector being involved. For viruses of this type normal quarantine procedures are advocated, but these will be effective only after methods of expert assessment and testing in special nurseries have been developed. The seed-transmissibility of xyloporosis must also be taken into account. The vector of citrus tristeza virus, *Aphis citricidus*, is unknown in the U.S.S.R., but the disease may have been introduced from countries where it is prevalent; it occurs only mildly in the absence of vectors. As a consequence of its prevalence in China [map 289], quarantine measures must be developed, especially in view of the interest of the Eastern Asia citrus stock.

Scaramuzzi (G.) & Salerno (M.). **Gravi infezioni di psorosi su piante di Mandarino nel Palermitano.** [Grave attacks of psorosis on Mandarin plants near Palermo.]—*Progr. agric.*, **5**, 11, pp. 1267–1271, 4 fig. (3 col.), 1959.

Around Palermo, Sicily, mandarin oranges (*Citrus reticulata*) suffer appreciable loss of yield every year from a disease which, from its symptoms and its transmissibility by chip budding to sweet orange, is considered to be due to the blind pocket str. of citrus psorosis virus [cf. **23**, 62; **37**, 476; map 65]. Trees of all ages are affected, many of them 20–25-yr.-old, especially those of the cultivars Avana and di Palermo, Tardivo di Ciaculli being somewhat less affected. The disease is seldom seen on sour orange, which is used as a stock. Research upon this condition, which was reported from Sicily [as 'scaly bark': **33**, 227] by Klotz in 1953, is urgently required in Italy.

Smith (T. E.). **Observations on Cotton rust (Puccinia stakmanii) under severe disease conditions.**—*Plant Dis. Reptr*, **44**, 2, pp. 77–79, 2 fig., 1960.

Destructive infestations (up to 75% crop loss in 1 case) from *P. stakmanii* [*P. cacabata*: cf. **37**, 721; **38**, 520] are recorded by New Mex. agric. Exp. Sta., University Park. Owing to a succession of showery summers susceptible grass hosts, particularly *Bouteloua aristidoides* and *B. barbata*, have increased and built up a high inoculum potential.

Avtonomov (A. A.). Новый метод оценки селекционного материала на устойчивость к фузариозному увяданию. [A new method for assessing selection material for resistance to *Fusarium* wilt.]—Хлопководство [*Khlopkovodstvo*], **10**, 2, pp. 18–19, 1960.

At the Central Selection Sta. sci. Res. Cotton Inst. seed from the best cotton plants, noted in summer-autumn inspections and harvested when the 1st 2–3 capsules opened, is tested immediately in soil inoculated with mycelium of *F.* [*oxysporum* f.] *vasinfectum* [cf. **38**, 407] (100 g. oats culture/25 kg. pot). Susceptible plants succumb either in the cotyledon stage or at the 2–3 straight leaf stage, 25–30 days after sowing. In 1959 a number of crosses from 10 individual selections were tested in this way. Of 10 samples from the line (S-2515×5–1451)×6015, 8 were resistant and from S-2283×6013 only 2. The author considers this method of assessing selection material immediately before harvest to be very promising.

THOMSON (N. J.) & BASINSKI (J. J.). **Bacterial blight of Cotton in North Western Australia.**—*J. Aust. Inst. agric. Sci.*, **25**, 4, pp. 297–298, 1959.

At the Kimberley Res. Sta., W. Australia, where bacterial blight of cotton (*Xanthomonas malvacearum*) [map 57] is generally of little account, 2 outbreaks of the disease occurred in 1958–9, the 2nd. after a cyclonic storm in early Apr., causing severe damage on susceptible vars. The disease could therefore be a threat to commercial cotton in N.W. Australia in wetter years.

[The information in this paper also appears in *Emp. Cott. Gr. Rev.*, **37**, 1, pp. 30–31, 1960.]

TUREL (F. L. M.) & LEDINGHAM (G. A.). **Utilization of labelled substrates by the mycelium and uredospores of Flax rust.**—*Canad. J. Microbiol.*, **5**, 5, pp. 537–545, 3 graphs, 1959.

Further studies at Dept Bact., Univ. Saskatoon [cf. **36**, 390; **37**, 355], involving the rate of assimilation of uniformly labelled glucose and other compounds by *Melampsora lini*. Aureomycin had little effect on their utilization, but actidione markedly reduced respiratory activity.

COLHOUN (J.). **Testing for resistance to Polyspora lini Laff. in Flax breeding.**—*Trans. Brit. mycol. Soc.*, **42**, 3, pp. 370–377, 1959.

At Queen's Univ., Belfast, cotyledons of potted flax plants were pricked with a needle in 3 or 4 places, and using a dropping bottle, a large drop of concentrated spore suspension derived from colonies of *P. lini* [**36**, 698; **38**, 388] from several sources was placed on each cotyledon. The inoculated seedlings were incubated for 3 days in moist atmosphere supplied by inverting over each pot a water-tight tin, the diam. of which fitted the rim of the pot. The seedlings and the blotting paper lining each tin were sprayed with water daily if necessary. After the tins were removed, the seedlings were allowed to dry off slowly, and the pots moved to the glasshouse or the open air. As all the plants develop the seedling phase of the disease, irrespective of whether they show resistance or susceptibility later on, they are all exposed to similar chances of developing stem break. The pot test for stem break is more exacting than can be applied in the field and vars. that were resistant invariably remained so in the field. Resistance to the browning phase, however, is best determined in the field. The stage of development at which the seedlings were inoculated or the variations in air temp. during incubation had no effect on stem-break incidence in a susceptible var., but conditions during growth of the plants were effective, the highest levels of attack being associated with high air humidity.

FERRI (F.). **La septoriosi della Canapa.** [Septoriosis of Hemp.]—*Ann. Sper. agr.*, N.S., **13**, 6, *Suppl.*, pp. clxxxix–cxcvii, 2 pl. (9 fig.), 4 fig., 1959. [Engl. summ.]

This account of the author's studies at the Ist. Pat. veg., Bologna, Italy, of hemp leaf spot (*Septoria cannabis*) [cf. **35**, 766] covers the symptoms of the disease, the morphological and biological characters of the causal organism, and control. The fungus is able to infect and damage the leaves and stem at any time during the growth of the plant. In severe outbreaks sprays containing Cu or dithiocarbamate should be applied early.

BAKKER (K.). **Parasiet op Anthurium.** [Parasite on *A.*]—*Coolia*, **6**, 4, pp. 2–3, 1959.

A fungus isolated from *Anthurium* leaves showing an ochre-yellow, later brown discoloration of the margins, followed by necrosis, was identified as *Septoria azaleae* [see below]; the hyaline, rod-shaped spores were $10 \times 1{\cdot}3\,\mu$.

Nogmaals de parasiet op Anthurium. [Once again the parasite on *A.*]—*Coolia*, **6**, 4, pp. 28–29, 1959.

With reference to Bakker's paper [see above] the following information is supplied by the Plantenziektenkundigen Dienst, Wageningen. The leaf-spotting pathogen of *Anthurium* was formerly known as *Septoria azaleae* [**6**, 616], but there appears to be no evidence of identity between the 2 spp. In 1941 the fungus was described by Kotthoff in Germany as *S. anthurii*, but according to J. A. von Arx it had already been designated *Gloeosporium minimum* Karst. & Har., so that its correct name would be '*S. minimum*'.

The method of control recommended in *Tuinbouwgids, 1959*, p. 622, 1959, consists in spraying at 2–3-weekly intervals with 300 g. ferbam or zineb 100 l. water.

Andreucci (E.). **Le malattie crittogamiche del Garofano nella zona di Pescia.** [The fungal diseases of Carnation in the vicinity of Pescia.]—31 pp., 16 fig., Florence, Vallecchi, Editore Officine Grafiche, 1959. [50 ref.]

The author's observations on the chief diseases of carnations in the vicinity of Pescia, Italy, are described with a concluding section on control. The diseases considered are rust (*Uromyces caryophyllinus*) [*U. dianthi*]; 'smut' (*Heterosporium echinulatum*) [*Didymellina dianthi*]; *Alternaria dianthi* [**37**, 18]; *Septoria dianthi*; flower rotting, caused by *Botrytis cinerea* [cf. **37**, 586]; *Fusarium roseum* [cf. **38**, 602]; collar rot due to *F. oxysporum* f. *dianthi* [*F. dianthi*: cf. **36**, 574] and to *Rhizoctonia* [*Corticium solani*: cf. **38**, 409]; basal rot (*Sclerotium rolfsii*) [cf. **35**, 679]; and shoot wilt caused by *Phytophthora palmivora* [cf. **38**, 696].

Cuscianna (N.). **Deperimenti e morie nelle coltivazioni di Garofani.** [Die-backs and wilts in Carnation plantings.]—*Progr. agric.*, **5**, 11, pp. 1272–1273, 1 fig., 1959.

Carnations in the Italian Riviera have for many years been subject to a wilt or die-back which is becoming more prevalent and causing severe damage. It starts in the propagating boxes with the rooting of the slips; at transplanting there are numerous failures; and later, many plants turn yellow and die in a few days. The roots of young plants become hard and fragile, the tissues under the bark being brown or black; affected plants are easily broken at the collar, the internal tissues being black and rotted.

The primary cause is the lack of a proper rotation. Further, much of the soil is hard, compacted, calcareous, and very alkaline. The plants grow badly in this exhausted and unsatisfactory soil and are attacked by soil fungi (*Fusarium*, *Rhizoctonia* [*Corticium*], *Verticillium*, and *Alternaria* spp. [**39**, 315]), which cause a tracheomycosis [cf. **38**, 409]. Investigations by the Phytopathological Observatory, Sanremo, have shown so far that only healthy cuttings should be used, the containers should be disinfected, the soil dressed with fertilizers and disinfected with vapam [loc. cit.] or mylone, and the plants treated with zineb. Immediately the 1st symptoms appear plants should be destroyed and the holes and the rest of the crop treated with a fungicide.

Zhdanov (L. A.). Селекция Подсолнечника на устойчивость к заразихе и ржавчине. [Selection of Sunflower for resistance to broom rape and rust.]—*Ex* Достижения по растениеводству [Achievements in plant growing], pp. 154–161, State publishers of agric. Literature, Moscow, 1958. Roubles 18.30.

Further information is given on the interspecific sunflower hybrid G-1219 developed by vniimémk [**35**, 827] which is resistant to *Puccinia helianthi* [**38**, 212]. At the vniimémk Plant Physiol. Lab. fertile hybrids were obtained by crosses of sunflower with *Helianthus tuberosus*, the F_4 from which were also resistant. Of hybrids produced at the Don Exp. Selection Sta. in 1953 from the wild annual *H. ruderalis*, Stepnyaki 800, and Vniimk 6540, as many as 64·7–83·3% were resistant; in 1954

infection was 6·8–29·5%. The results of the 1955 tests confirmed the higher resistance of the interspecific hybrids.

Gulf Ryegrass means new horizons for Rice farmers.—*Rice J.*, **62**, 10, pp. 16–18, 3 fig., 1959.

Gulf rye grass (a direct increase of the improved var. La Estanzuela [of *Lolium multiflorum*: **32**, 317]) is the most resistant to leaf (crown) rust [*Puccinia coronata*: cf. **36**, 249; **37**, 98] of all vars. at present available in the Gulf Coast area of Texas. Common or domestic strs. grown locally usually become heavily infected in Apr. and May, but Gulf has not been severely damaged during the past 6 yr. at the Rice-Pasture Sta.

Rao (P. G.), Reddy (G. S.), & Reddy (T. C. V.). **Four new hosts of Ephelis.**—*Sci. & Cult.*, **25**, 1, pp. 74–75, 1 fig., 1959.

E. oryzae [**38**, 691] was identified at Dept Mycol. Plant Path., agric. Coll., Bapatla, India, on *Arthraxon ciliaris* var. *coloratus*, *Saccolepis indica*, *Cynodon dactylon*, and rye.

Fry (P. R.), Grogan (R. G.), & Lyttleton (J. W.). **Physical and chemical properties of Clover mosaic virus.**—*Phytopathology*, **50**, 2, pp. 175–177, 1 fig., 3 graphs, 1960.

Further studies at the D.S.I.R., Auckland, N.Z., showed that purified preparations of the virus [**39**, 232] from red clover and peas contain 15% N, 0·5% P, and 5% ribonucleic acid, the ratio of the bases in which are guanine 0·59, adenine 1·19, cytosine 1·05, and uracil 1·17. The virus particle is a flexuous rod, diam. 150±20 A, with distribution of lengths showing a peak at 4,800 A. The isoelectric point is pH 4·5 and the sedimentation coefficient at zero conc. 112 Svedberg units.

Halisky (P. M.), Houston (B. R.), & Magie (A. R.). **Alfalfa mosaic virus in White Clover and Potatoes.** *Plant Dis. Reptr*, **44**, 2, pp. 120–125, 1 fig., 1960. [24 ref.]

Two strs. of lucerne mosaic virus [cf. **38**, 753] studied at Univ. Calif., Davis, were identified as lucerne mosaic virus N [McWhorter, *Phytopathology*, **39**, p. 861, 1949] and common lucerne mosaic virus [cf. **37**, 732; **38**, 537] on the basis of differential responses of potato, which are described. Both strs. were tuber transmitted (28·2 and 41·3%, respectively), though tuber necrosis was not noticed. In the greenhouse the N str. reduced flowering heads of red clover by 29%, of white clover by 41%, and of alsike clover by 87%; the number of seeds/head was reduced also.

Edmunds (L. K.) & Hanson (E. W.). **Host range, pathogenicity, and taxonomy of Ascochyta imperfecta.**—*Phytopathology*, **50**, 2, pp. 105–108, 1960.

Some of this information from Wis. agric. Exp. Sta., Madison, has already been noticed [**38**, 524]. Taxonomic considerations are discussed and *A. imperfecta* is considered to be the correct name for the black stem fungus [cf. **9**, 273; **35**, 828], of which lucerne is evidently the primary host, red clover being but one of the more susceptible of a wide range of host spp.

Hawn (E. J.). **Histological study on crown bud rot of Alfalfa.**—*Canad. J. Bot.*, **37**, 6, pp. 1247–1249, 1 pl. (7 fig.), 1959.

At the Canada agric. Res. Sta., Lethbridge, Alta, microscopic examination of stained sections of lucerne crown buds inoculated with *Rhizoctonia* [*Corticium*] *solani*, *Fusarium avenaceum*, *F. acuminatum*, and *Ascochyta imperfecta* [**37**, 416] indicated that each could cause crown bud rot under conditions similar to those occurring in the field. *C. solani*, which quickly ramifies in the bud tissues on

inoculation, normally enters the crown via the vessels. *F. acuminatum* enters the crown buds via the stomata of the young leaves. At 15° C. the 2 *F.* spp. showed greater ability to cause crown bud rot than either *C. solani* or *A. imperfecta*; the last-named causes rotting of crown buds at soil temps. comparable to those of early spring (10°) and develops only very slowly in the host.

Purss (G. S.). **Root rot of Lucerne.** –*Qd agric. J.*, **85**, 12, pp. 767–770, 4 fig., 1959.

This disease caused by *Phytophthora cryptogea* [**39**, 323] and *P. parasitica* occurs in a number of localities and is best controlled by adequate surface drainage and by an avoidance of replanting lucerne after a thin stand has been ploughed in.

Dessureaux (L.). **Heritability of tolerance to manganese toxicity in Lucerne.**—*Euphytica*, **8**, 3, pp. 260–265, 4 graphs, 1959. [Dutch summ.]

At the Exp. Farm, Ste Anne de la Pocatière, Quebec, and the Welsh Plant Breeding Sta., Aberystwyth, 4 plants (3 from a highly tolerant cross, and 1 unrelated plant known to be highly susceptible) were selfed and crossed in all possible combinations without emasculation. The progeny, grown in pots at known Mn concs., exhibited high heritability, as estimated from a parent-progeny regression analysis interpreted under the assumption of autotetraploid inheritance. Genes controlling tolerance of toxicity were assumed to be additive and to have low or no dominance, thus increasing the effectiveness of selection. The results demonstrate that response to selection for tolerance of toxicity should be effective if the selfed-progeny test in the seedling stage is used to identify the most tolerant genotypes.

Leppik (E. E.). **Melilotus italica, a new host of Uromyces striatus.**—*Plant Dis. Reptr*, **44**, 3, pp. 184–185, 1 fig., 1960.

A note from Dept Agric., Ames, Iowa, of *U. striatus* var. *medicaginis* [cf. **38**, 560] on *M. italica*.

Drake (C. R.). **Southern blight of Birdsfoot Trefoil (Lotus corniculatus).**—*Plant Dis. Reptr*, **44**, 2, pp. 115–116, 2 fig., 1960.

Sclerotium rolfsii [cf. **33**, 234], reported by U.S. Dept Agric., Blacksburg, Va, on birdsfoot trefoil (*Lotus corniculatus*) is a new host record. It attacks and girdles stems near the soil line. In blight and girdling symptoms it resembles *Rhizoctonia* [*Corticium*] *solani* [cf. **37**, 496; **39**, 233], though the latter generally attacks rather more above soil level, producing brown-banded lesions. Infection is stimulated by the presence of organic matter.

Vukovits (G.). **1959, ein Jahr der Blattfleckenkrankheiten.** [1959, a year for leaf spot diseases.]—*Pflanzenarzt*, **12**, 12, pp. 124–126, 5 fig., 1959.

Leaf spot diseases of fruit trees were severe in Austria in 1959, a wet year. Among the more important ones noted were *Cylindrosporium padi* [*Higginsia hiemalis*] on sweet cherry, *Clasterosporium carpophilum* on cherry and peach, *Sphaceloma* sp. on prune plum, *Phyllosticta mali* on apple, and *Mycosphaerella sentina* on pear.

Turner (J. N.). **Control of fungal diseases of fruit in storage.**—*Outlook on Agric.*, **2**, 5, pp. 229–237, 1 pl., 1959. [26 refs.]

The author, writing from Jealott's Hill Res. Sta., Bracknell, Berks., discusses spoilage in transport and storage of fruit (citrus, apples, pears, stone and soft fruits, bananas, grapes, melons, pineapple) and reviews methods of preservation (cold storage, fumigants, washes and dips, and coatings and wraps, either chemically treated or not).

Bovey (R.). **Note sur la transmission du virus du bois souple du Pommier au Poirier et vice-versa.** [Note on the transmission of Apple rubbery wood virus to Pear

and vice-versa.]—*Annu. agric. Suisse*, (**73**, éd fr. **60**) N.S. **8**, 6, pp. 655–657, 1 fig., 1959. [Germ., Engl., Ital. summ.]

When pear seedlings under glass at Lausanne were bud-grafted with Golden Delicious apple infected by apple rubbery wood virus [**34**, 598], 2 subsequently developed chlorotic symptoms and the leaves became covered with small reddish patches. The virus was then graft transmitted to other pears (likewise raised from seed) and Lord Lambourne apple scions grafted to these developed unmistakable symptoms of rubbery wood.

Powell (D.). **The inhibitory effects of certain fungicide formulations to Apple scab conidia.**—*Plant Dis. Reptr*, **44**, 3, pp. 176–178, 1960.

Tests by Ill. agric. Exp. Sta., Urbana, in which infected leaves on the tree were immersed in various concs. of fungicides and then examined after 1–21 days for inhibition of spore germination, showed that dodine (cyprex) [**38**, 703], captan, phaltan, and dyrene [**38**, 386] at 2,400 p.p.m. checked germination of *Venturia inaequalis* conidia for 21 days, dodine exhibiting appreciable residual toxicity. The same chemicals at lower conc. and also dichlone [**38**, 728] allowed spores to recover after 10 days, whereas niacide M, moderately inhibitive at the beginning, proved persistent. Zineb gave no control and, when mixed with captan, tended to reduce the effect of the latter some days after treatment. On the other hand a captan-dodine combination was slightly synergistic. Normal release of the conidia was prevented by 50% captan or phaltan 50W at 2,400 p.p.m.

Preece (T. F.). **A staining method for the study of Apple scab infections.**—*Plant Path.*, **8**, 4, pp. 127–129, 2 pl., 1959.

The procedure described (from Plant Path. Lab., Harpenden, Herts.) for staining apple leaves infected by *Venturia inaequalis* is to rinse in distilled water and then (5 min. each step) immerse in 1% periodic acid, wash in distilled water, immerse in decolorized basic fuchsin, wash in sulphurous acid solution, immerse in distilled water, and mount in it for examination. The stained material can be preserved for some time in ethyl or methyl alcohol without loss of colour.

On freshly picked green leaves and fruit, stained directly without removal of pigments, there is an excellent contrast between the red lesions and the green background. The distribution pattern of infection is clearly revealed and lesions can be detected in the field at an early stage.

Govi (G.). **Ricerche biologiche sull' agente della ticchiolatura del Melo.** [Biological researches on the agent of Apple scab.]—*Ann. Sper. agr.*, N.S., **13**, 6, pp. 1087–1096, 3 fig., 4 graphs, 1959. [Engl. summ.]

At Univ. Bologna, Italy, the modality, the percentage germination, and the length of the germ tube of ascospores and conidia of *Venturia inaequalis* were measured in an attempt to differentiate between 3 strs. collected in 3 regions of Emilia, the tests being made in the dark and in the light at 20, 25, and 28° C. The max. germinability of the ascospores and conidia was reached within 19 hr., or slightly less for ascospores developed in the light. Light also appeared to facilitate the lengthening of the germ tube, especially of the ascospores.

Guthrie (E. J.). **The occurrence of Pezicula alba sp. nov. and P. malicorticis, the perfect states of Gloeosporium album and G. perennans, in England.**

Sharples (R. O.). **Observations on the perfect state of Gloeosporium perennans in England.**—*Trans. Brit. mycol. Soc.*, **42**, 4, pp. 502–506; pp. 507–512, 1 pl., 2 fig., 1959.

At the Imp. Coll. Sci. Tech., London, apothecia of *P. malicorticis*, previously found only in the U.S.A. [**19**, 226] and Holland [**36**, 328], and of *P. alba* were obtained on

material of Cox's Orange Pippin from Kent and the pathogenicity of the imperfect states to apple was demonstrated. *P. alba* Guthrie has asci $125–150 \times 13–24\,\mu$, and ascospores $20–30 \times 7–10\,\mu$, 3–5 (6) septate.

In the 2nd paper details are given from Long Ashton Res. Sta., Univ. Bristol [cf. **39**, 116], of the morphology of apothecia produced there on apple shoot lesions infected by *Neofabraea perennans* (or *P. malicorticis*), and considered to be the perfect state of the fungus, the taxonomy of which is discussed.

Brook (P. J.). **Lenticel spot, bitter rot and ripe spot of Apples.**—*Orchard. N.Z.*, **33**, 1, pp. 20–21, 23, 25, 27, 29, 5 fig., 1960.

This report from D.S.I.R., New Zealand, notes occurrence of lenticel spots [cf. **33**, 236] on Sturmers at about picking time and on Jonathans left long on trees. Of fungal infections via lenticels [cf. **4**, 484], bitter rot, ripe spot, and *Diaporthe perniciosa* [cf. **33**, 406] were occasionally noticed. Bitter rot (*Glomerella cingulata*) [**36**, 193], most severe in the Auckland area, established itself rarely in stem cankers, but mostly overwintered in apple mummies, and could also be transferred from naturally infected herbs, shrubs and trees. Though rather ineffective in the glass-house, Bordeaux mixture in 6 applications between 18 Dec. and 10 Mar. at 2 6 100 +casein sticker at 4 oz./100 gal. reduced incidence to 16% on Sturmers in the field (untreated trees 96%); next best were 50% captan and 70% ziram, both wettable powders at 2 lb./100 gal., reducing the disease to 41 and 46%, respectively. Very satisfactory control of ripe spot (*Neofabraea perennans* [**38**, 755] and *Gloeosporium album* [loc. cit.]) on Sturmer in Nelson was obtained from the spray programme and cold storage on principles already noted.

Behr (L.). **Stemphylium botryosum Wallr. als Erreger einer Lagerfaule am Apfel in Deutschland.** [*Pleospora herbarum* as the cause of a storage rot in Apples in Germany.]—*Phytopath. Z.*, **37**, 3, pp. 245–251, 4 fig., 1960. [Engl. summ.]

At the Phytopath. Inst., Martin Luther Univ., Halle-Wittenberg, *P. herbarum* was isolated from an apple from a fruit storage test. The fruit rot caused was that known as storage rot of apples [**13**, 107, 583; **15**, 424; **24**, 22; **25**, 564], though not previously found in Germany. Inoculation, reisolation, and reinfection tests were all positive. The susceptibility of apple increases with storage. Varietal differences in susceptibility or resistance could not be detected. The likelihood of the disease spreading in storage is high.

Sitterly (W. R.) & Shay (J. R.). **Physiological factors affecting the onset of susceptibility of Apple fruit to rotting by fungus pathogens.** –*Phytopathology*, **50**, 2, pp. 91–93, 2 graphs, 1960.

This study has been noticed [**38**, 266].

Askew (H. O.), Chittenden (E. T.), Monk (R. J.), & Watson (Joyce). **Chemical investigations on bitter pit of Apples. II. The effect of supplementary mineral sprays on incidence of pitting and on chemical composition of Cox's Orange fruit and leaves. III. Chemical composition of affected and neighbouring healthy tissues.**—*N.Z.J. agric. Res.*, **3**, 1, pp. 141–168; 169–178, 1960.

The 1st paper from the Cawthron Inst., Nelson [cf. **39**, 423], reports that Mg, Na, and especially K acetate sprays increased bitter pit, whereas Ca acetate reduced it markedly in the Annesbrook orchard in 1 season, though not to the same extent in the next. High dry matter and ash contents and a high K/Ca ratio in the fruit were associated with increased incidence of bitter pit. Analysis of leader leaves (more valuable than that of spur leaves) revealed that high Ca content and low K/Ca ratio are correlated with reduction in bitter pit in the fruit. Inorganic constituents seem to be more important than the sugars in considering storage qualities, but a certain amount of sugars is probably necessary for good quality.

The 2nd paper notes a general migration of minerals, including Ca, Mg, K, Na, and P, and also of N from the healthy to the infected tissues, which were also richer in glucose, well supplied with fructose, but poorer in sucrose. Sucrose and total reducing sugars increased notably during storage, while starch content decreased. Affected tissues contained more starch than the healthy (0·81 and 1·17% in 2 orchards, compared with 0·19 and 0·13%, respectively). With increase of the disorder total ash content of the whole fruit rose, being largely concentrated in the discoloured tissues. High values of the ratios Mg/Ca, K/Mg, K/Ca, and K/N accompanied high incidence of bitter pit.

KEGLER (H.). **Untersuchungen über Virosen des Kernobstes. II. Das Ringfleckenmosaikvirus der Birne.** [Studies on pome fruit viroses. II. Ring spot mosaic virus of Pears.]—*Phytopath. Z.*, **37**, 4, pp. 379–400, 10 fig., 2 graphs, 1960. [Engl. summ. 36 ref.]

Investigations by the Inst. für Phytopathologie, Aschersleben [cf. **39**, 325], disclosed that ring spot mosaic [? pear mosaic virus str.: **35**, 831] is frequent in nurseries and is in danger of spreading as it is usually present in the very susceptible Gellerts Butterbirne, used as a stock. Symptoms are clearly detectable only in vars. of high and medium susceptibility, and only in May and June. Neue Poiteau was very susceptible; less susceptible were Boscs Flaschenbirne, Bunte Juli, Clapp's Favourite, Grosse Rommelter, Gute von Ezée, Williams' Bon Chrétien, Windsor, Winterbaronsbirne, *Pyrus salicifolia*, and others; Alexander Lucas, Esperine, Köstliche von Charneu, Oktjabrskaja, *P. aromatica*, and *P. phaeocarpa* had no symptoms. Symptoms are accentuated when the shoots are cut back severely. Increase in trunk girth is reduced by about 10% by infection and shoot length and leaf surface by about 20%. Leaf diam. is reduced because the palisade cells are shorter and the spongy parenchyma cells closer together. Diseased trees are more susceptible to frost. In sections of infected leaves only a slight reduction in colour of the chloroplasts was visible; when the tissue becomes necrotic they disintegrate. Reducing sugars are increased by about 20% by the end of July. Transmission was effected by stem and bark grafting but not by abrasion. The inactivation point of the virus and that of irreversible damage to the scion lie roughly within the same range of temp.

LEE (C. H.). **Studies on Pear scab and its control.**—*Acta phytopath. sinica*, **5**, 2, pp. 65–78, 6 fig., 2 graphs, 1959. [Chin. Abs. from Engl. summ.]

At Inst. Pomology, agric. Acad., overwintered conidia of *Venturia pirina* [**15**, 815] were found capable of germinating on young leaves, and are thus regarded as a primary source of infection. First symptoms appeared on the bases of young shoots infected from still attached bud scales; their early removal and a subsequent spray with Bordeaux mixture, followed by 2 more in July, reduced incidence in 1953 and 1954 to 2·2–11%, compared with 87–96·4% on untreated trees.

ARK (P. A.) & THOMPSON (J. P.). **Hydrated lime improves nuclay-streptomycin dust for Pear blight control.**—*Plant Dis. Reptr*, **44**, 3, pp. 204–205, 1960.

At Univ. Calif., Berkeley, the effectiveness of nuclay-streptomycin dust against *Erwinia amylovora* [cf. **35**, 615] as judged by assay plate inhibition zones rose by about 11% if 50% hydrated lime was added to it. It also lightens the dust, less of which is needed.

DIENER (T. O.) & WEAVER (M. L.). **A wilt disease of Peach and Pear seedlings caused by a strain of Penicillium funiculosum.**—*Phytopathology*, **50**, 2, pp. 161–163, 2 fig., 1960.

This further account from State Coll. Wash., Irrigation Exp. Sta., Prosser [cf. **37**,

90], notes that a wilt similar to that of Lovell peach seedlings, which is most evident in hot weather, also affected seedlings of pear and of *Pyrus ussuriensis* and *P. calleryana*, and to a less extent *P. serotina*, sweet cherry, and *Prunus tomentosum* grown in Hoagland's solution to which a culture of the fungus was added. There was no evidence of the fungus within the roots of wilted seedlings and cell-free culture filtrates also induced the wilt, though in a milder form than when the fungus was present.

PINE (T. S.) & COCHRAN (L. C.). **Plum rusty blotch—a transmissible disorder found in Southern California.**—*Plant Dis. Reptr*, **44**, 2, pp. 87–88, 1 fig., 1960.

This disease, 1st observed in 1953, is noted from the U.S. Dept Agric., Riverside, Calif., as appearing on Santa Rosa and Late Santa Rosa plum trees. Early symptoms are chlorosis of the leaf base, initially spreading continuously, later forming blotches; within a few weeks these turn reddish brown and show numerous red spots from a pinpoint to $\frac{1}{8}$ in. in size, which eventually drop away, making the leaves shot-holed. Young and old leaves are attacked and are reduced in size by $\frac{1}{2}$–$\frac{1}{3}$ and deformed. Natural spread of the infection was recorded over a distance of 200 ft. and the causal agent is believed to be a virus.

BLUMER (S.). **Echter Mehltau auf Süßkirschen (Prunus avium L.) und Zwetschgen (Prunus domestica L.).** [Powdery mildew on Sweet Cherry and Prune Plum.]—*Phytopath. Z.*, **37**, 3, pp. 317–320, 1 fig., 1960.

In recent years aseptically raised seedlings from crosses of sweet cherry with Fellenberg prune plum have been severely attacked both in the greenhouse at the Wädenswil Res. Inst., Zürich [cf. **32**, 215], and in the field by powdery mildew. Studies indicate that this mildew is *Erysiphe polyphaga*, with the possibility of several strs. on various hosts. Only cucumber was infected by the cherry and plum strs. The fact that these mildews do not attack older plants or the young leaves of older plants indicates an ontogenetically conditioned resistance.

VITANOV (M.). Пръскане на Сливовите дървета през време на цъфтежа. [Sprays of Plum trees during blossoming.]—Овощарство [*Ovoshtarstvo*], 7, 3, pp. 29–31, 1960.

In further experiments [**38**, 91] by the Dryanovo Fruit Res. Sta., Bulgaria, the best control of red leaf spot [*Polystigma rubrum*] was obtained from zineb (followed by 1% Bordeaux mixture), captan, fuclasin ultra, and pomarsol, all at 0·2%. Whereas zineb and captan had no phytotoxic effect, Bordeaux mixture affected blossom and the development of fruit. All the fungicides tested gave slightly less effective control if applied first during the blossom period rather than after it.

BRODERICK (H. T.) & HEYNS (A. J.). **Black spot disease attacks Plums in Western Province.**—*Fmg in S. Afr.*, **35**, 8, pp. 8–9, 2 fig., 1959.

Isolates resembling *Xanthomonas pruni* [map 340] were obtained from the Japanese plum vars. Kelsey, Gaviota, and Golden King, the last being most susceptible (85% fruit infection in 1 case); other vars. were not affected. Zn-lime sprays (using $ZnSO_4$ in Bordeaux mixture instead of $CuSO_4$) or Bordeaux, both with a spreader, as they may be phytotoxic, are recommended at bud movement and petal fall, with 2 more at intervals of 3 weeks. Diseased shoots should be pruned out and destroyed in winter as far as possible.

SCHOFIELD (ELIZABETH R.) & CLIFT (L. F.). **Trials of the influence of stem builders on bacterial canker of Plum in the West Midlands.**—*Plant Path.*, **8**, 4, pp. 115–120, 1959.

In trials in 3 orchards, at Pershore Inst. Hort., Bank Farm, Mathon, and Luddington

Hort. Sta., Victoria plum and Burbank's Giant Prune plum, susceptible to bacterial canker [*Pseudomonas mors-prunorum*: cf. **26**, 159; **38**, 15], were each high- and low-worked on the rootstocks Warwickshire Drooper, Myrobalan B, and Pershore Yellow Egg [**23**, 31]. In the only trial in which severe infection developed Pershore Yellow Egg displayed little resistance when used as a stem builder. Myrobalan B was highly resistant and Warwickshire Drooper intermediate. Myrobalan B is apt to produce a very large tree with persistent suckers.

Diener (T. O.). **Free amino acids and amides in healthy and virus-infected Cherry and Peach leaves.**—*Phytopathology*, **50**, 2, pp. 141–145, 4 graphs, 1960. [25 ref.]

Chromatographic analyses at Irrigation Exp. Sta., Prosser, Wash. [cf. **34**, 378], of leaves of cherry (*Prunus mahaleb* and *P. avium*) and peach, from healthy and virus-infected trees are reported. Proline, which lessened in healthy peach in summer, was present in considerable amounts throughout the season in leaves infected by peach western-X disease virus; they also consistently contained accumulations of pipecolic acid, absent from healthy leaves after early spring, which may result from disturbance of lysine metabolism and be related to symptom production. Baiakiane, a compound related to pipecolic acid, was sometimes detectable in *P. mahaleb* infected by [peach] ring spot virus; cherry mottle leaf and rasp leaf viruses in sweet cherry did not appreciably affect the free amino acid or amide content of the leaves.

Wagnon (H. K.), Traylor (J. A.), Williams (H. E.), & Weinberger (J. H.). **Observations on the passage of Peach necrotic leaf spot and Peach ring spot viruses through Peach and Nectarine seeds and their effects on the resulting seedlings.**—*Plant Dis. Reptr*, **44**, 2, pp. 117–119, 1960.

Indexing of 7 vars. and visual inspection at Calif. Dept Agric. showed that seed transmission of peach ring spot virus [**38**, 610] occurred in 1·1–11·7% seedlings and peach necrotic leaf spot virus [**33**, 610; **38**, 386] in 3–9%, both max. figures relating to var. Alamar. All seedlings affected by leaf spot also carried ring spot and gave a normal ring spot reaction on Shiro-fugen cherry. Growth of infected seedlings was reduced by about 15%.

Graves (C. H.) & Hurt (B. C.). **Contact fungicides for Peach scab control.**—*Plant Dis. Reptr*, **44**, 2, pp. 129–131, 1960.

At Miss. agric. Exp. Sta. after a dormant application of puratized apple spray (phenyl Hg monoethanol ammonium acetate) at 2½ pints/100 gal. on 2–3 Mar., captan sprays (2 lb./100 gal., 50% wettable) were applied from 28 Apr.–12 June, 1959, on 4-yr.-old Redhaven peach trees and continued to 20 July on Elberta to control brown rot [*Sclerotinia fructicola*]. Percentage scab (*Cladosporium* [*Fusicladium*] *carpophilum*) [cf. **35**, 379] on the fruit was reduced by the dormant eradicant from 34·38 on Redhaven and 57·3 on Elberta (both unsprayed) to 0·03 and 0·07, respectively.

Diener (U. L.) & Carlton (C. C.). **Dodine-captan combination controls bacterial spot on Peach.**—*Plant Dis. Reptr*, **44**, 2, pp. 136–138, 1960.

Sprays of Elberta peach trees with combinations of captan, S, and dodine (coined common name of *n*-dodecyl-guanidine acetate [cf. **38**, 150], used in the form of cyprex dodine 65-W (Amer. Cyanamid Co.) at 1 lb./100 gal.) at Auburn Univ. agric. Exp. Sta., Ala, demonstrated an effective control of bacterial spot (*Xanthomonas pruni*) [cf. **36**, 770] by dodine-captan; dodine-S though also effective proved phytotoxic. Captan appeared to eliminate the phytotoxicity of dodine and stimulate its protective effect.

Primo Yúfera (E.), Botella Soto (C.), & Royo Iranzo (J.). **Diagnóstico foliar. II. Relación entre ciertos estados anómalos del melocotonero y el contenido en oligoelementos de sus hojas.** [Foliar diagnosis. II. Relationship between certain anomalous states of the Peach tree and the micro-element content of its leaves.]—*Bol. Inst. Invest. agron., Madr.*, **19**, 41, pp. 323–330, 6 col. fig., 1959.

In further studies [cf. **38**, 692] at the Departamento de Química Vegetal, Patronata 'Juan de la Cerva', Facultad de Ciencias, Valencia, analyses of 9 leaf samples from healthy and chlorotic peach trees from 6 groves showed normal Cu and Mn levels in all. The deviation from the normal Fe and Zn levels in chlorotic leaves varied, whereas in all the chlorotic samples there was more B (51–76 p.p.m.) than in healthy leaves (32–36 p.p.m.). One sample with a high B level showed symptoms: pronounced yellowing of the tip and edges and a typical greying in the middle of the leaves. In samples with the lowest Fe level the veins stood out clearly in green, like skeletons. Leaves with Fe levels above 100 p.p.m. had no chlorotic symptoms.

Majerník (O.) & Stanová (Mária). **Vplyv teploty na niektoré druhy húb so zretel'om na predčasné odumieranie Marhúl' (Prunus armeniaca L.).** [Influence of temperature on some fungus spp. in relation to the premature dying-off of Apricot trees.]—*Biológia, Bratislava*, **14**, 1, pp. 15–27, 4 graphs, 1959. [Russ., Germ. summ.]

The fungi used in these studies reported from the Slovak Acad. Sci., Bratislava, Czechoslovakia, were isolated from the wood of wilting apricot branches or those freshly killed by 'apoplexy' [cf. **10**, 529; **34**, 604, *et passim*] and grown on malt agar at 10–30° C. At 10° the parasitic activity of *Monilia* [*Sclerotinia*] *laxa* and *Trichoderma viride* [*T. lignorum*] ceased more rapidly in the host than in culture, where it was maintained for up to 10 days. For *Stereum hirsutum* and *Fusarium* sp. the state of the host was the decisive factor in the establishment of infection and development of wilting. Thus, inoculation experiments performed during dormancy and budding at 10–17° were successful, while variable results were obtained in the growing season. Seedlings with frost-damaged tissue wilted at above 20° and below 60% R.H. but recovered when the temp. was reduced and R.H. increased.

Willison (R. S.), Weintraub (M.), & Tremaine (J. H.). **Serological and physical properties of some stone-fruit viruses. I. Preparative and serological techniques.**—*Canad. J. Bot.*, **37**, 6, pp. 1157–1165, 4 diag., 6 graphs, 1959.

At the Bot. and Plant Path. Div., Canada Dept Agric., Ottawa, str. Y. 4 of [sour] cherry yellows virus [cf. **37**, 343] was purified from cucumber by 4 methods, which differed mainly at the clarification stage; (*A*) the homogenate buffered at pH 6·5 was frozen; (*B*) leaves were frozen and the expressed sap buffered at pH 5; (*C*) freshly expressed sap was diluted with pH 5 buffer; or (*D*) dialyzed against 0·05 M acetate buffer at pH 4·5. One or 2 cycles of differential centrifugation followed clarification. Though freezing inactivated the virus, methods *C* and *D* yielded infective preparations. Ultra-violet absorption spectrum analysis and particle size and sedimentation rate determinations, supported by infectivity tests, indicated that in the infective preparations the virus replaced most if not all the components found in comparable extracts from healthy sources. The agar gel diffusion technique was used for precipitin tests: virus antigen from cucumber sources reacted with homologous antiserum or with antiserum derived from infected cherry petals and vice versa.

Wilks (J. M.) & Reeves (E. L.). **Flowering Cherry, a reservoir of the little Cherry virus.**—*Phytopathology*, **50**, 3, pp. 188–190, 1960.

Details from U.S. Dept Agric., Wenatchee, Wash., and Canada Dept Agric.,

Summerland, B.C., of work indicating the identity of the K & S and [cherry] little cherry [virus] diseases, already noticed in brief [**38**, 610].

Cameron (H. R.). **Death of dormant buds in Sweet Cherry.**—*Plant Dis. Reptr*, **44**, 2, pp. 139–143, 3 fig., 1960.

'Dead bud' disease, reported by Oregon agric. Exp. Sta., Corvallis, as extremely serious in the Willamette Valley, is signalled by a brown discoloration within the dormant buds in Feb. and Mar., with subsequent dark-brown areas forming at the base and sometimes extending to the cortex of the shoot; the affected buds are killed but no leaf spots or cankers develop. A str. of *Pseudomonas syringae* [cf. **31**, 69] was shown to be responsible: it differed in host range and only rarely induced cankers on *Prunus*. Bordeaux mixture (8–8 or 12-12–100) or puratized agricultural spray (1 pint 100 gal.) with a spreader-sticker were the most effective means of control.

Cornuet (P.) & Morand (J.-C.). **Transmission du virus de la mosaïque du Tabac par le puceron du Fraisier, Passerinia fragaefolii Cock.** [Transmission of Tobacco mosaic virus by the Strawberry aphid, *Pentatrichopus fragaefolii*.]—*C. R. Acad. Sci., Paris*, **250**, 9, pp. 1750–1752, 1960.

At the Station de Pathologie Végétale, Versailles, tobacco mosaic virus was transmitted from strawberry [**39**, 429] to strawberry and Samsun tobacco but not to Xanthi or *Nicotiana glutinosa*. The symptoms on tobacco took over 45 days to develop.

Smirin (S.). **Banana growing in Israel.**—*Trop. Agriculture, Trin.*, **37**, 2, pp. 87–95, 1 graph, 1960.

According to this report from Rehovot agric. Res. Sta., Panama disease [*Fusarium oxysporum* f. *cubense*: map 31], *Cercospora* leaf spot [*Mycosphaerella musicola*: map 7], and bunchy top virus [map 19] of bananas are not present in Israel.

Loos (C. A.). **Symptom expression of Fusarium wilt disease of the Gros Michel Banana in the presence of Radopholus similis (Cobb, 1893) Thorne, 1949 and Meloidogyne incognita acrita Chitwood, 1949.**—*Proc. helminth. Soc. Wash.*, **26**, 2, pp. 103–111, 3 fig., 1959.

In pot experiments at the Changuinola Res. Sta., Almirante, Panama, infestation of Gros Michel banana roots with either the burrowing nematode *R. similis* or the root-knot nematode *M.i. acrita* was not a prerequisite for wilt disease infection when spores of *Fusarium oxysporum* f. *cubense*, from culture, were added at 14,000,000/sq. in. soil and drenched in with water [cf. **37**, 729]. When the roots were heavily infested by *R. similis* the period between inoculation and symptom appearance was considerably shortened, though final incidence was not affected at this high inoculum level. *R. similis* caused severe lesioning and destruction of banana roots; the root system was severely depleted and plant growth affected. The lesions were often large, girdling the root and extending into the stele.

Calpouzos (L.) & Theis (T.). **A simple method for estimating oil-mist deposit on Banana leaves.**—*Trop. Agriculture, Trin.*, **37**, 1, pp. 51–52, 1 fig., 1960.

At the U.S. Dept Agric., Mayaguez, Puerto Rico, the coverage obtained on banana plants with an oil-mist spray [against *Mycosphaerella musicola*: **39**, 183] was evaluated by means of oil-indicator cards (Davis & Elliott, *J. econ. Ent.*, **46**, 4, pp. 696–698, 1953). Pieces of Printflex cover offset, process plate, or Richfold paper (Mead Paper Corp., Chilicothe, Ohio), $2{\cdot}5 \times 3{\cdot}5$ in. are dipped in a saturated solution of a dye (Du Pont oil red, E.I. Du Pont Nemours & Co., Wilmington, Del.), leaving a 1 in. band to write on. The cards are attached to the leaves with paper clips and oil droplets impinging on the dyed surface make permanent, readily visible spots, the size of which is roughly proportional to the original droplet diam.

Dew or rain does not obliterate these marks. Droplet diam. can be calculated from the spots by multiplying by a 'spread factor' ascertained by placing glass slides and oil-indicator cards side by side on leaves, spraying, and measuring the diams. of drops and spots; av. droplet diam. ÷ av. spot diam. is the 'spread factor'.

BECCARI (F.) & GOLATO (C.). **Ricerche e prove di lotta contro le crittogame nocive al Banano. I. Prove orientative sull' azione in vitro di alcuni fungicidi, minerali e di sintesi, e di alcuni fungistatici su colture pure di Gloeosporium musarum (Cke et Massee).** [Researches and tests on the control of fungi injurious to the Banana. I. Preliminary tests upon the effect *in vitro* of certain mineral and synthetic fungicides and certain fungistatics on pure cultures of *G. musarum*.] —*Riv. Agric. subtrop.*, **53**, 10–12, pp. 411–427, 14 fig., 1959. [Engl. summ. 20 ref.]

In further studies of the infection of the Giuba dwarf banana by *G. musarum* [cf. **36**, 199] (now increasing), at the Ist. agron. per l'Oltremare, Florence, carrot agar plate cultures were treated with several proprietary fungicides. The results showed that *G. musarum* was not affected by S (thiovit) dusting, though its growth was retarded by copper Sandoz (cuprous oxide), orthocide 50 (captan), and pharmaceutical mycostatin, and completely arrested by agricultural mycostatin 20. Experiments are to be conducted in Somalia to ascertain whether dusting the cut stems with mycostatin before packing will control stem end rot, caused chiefly by *G. musarum*.

TISSEAU (M.-A.). **La déficience en cuivre et en zinc chez l'Ananas : le 'crook-neck'.** [Copper and zinc deficiency in Pineapple: 'crook-neck'.]—*Fruits d'outre mer*, **14**, 9, pp. 363–367, 1 pl. (7 fig.), 2 fig., 1959.

The recent appearance of pineapple crook-neck [cf. **28**, 130] in French Guinea is reported from the Centre guinéen de Recherches fruitières, Foulaya. Spraying the leaves (twice if necessary) with 1% $ZnSO_4$ at 2,000 l./ha. as soon as symptoms appear, combined with an application of 1·5–2% $CuSO_4$, 2,000 l./ha., to the soil near the base of the plant, care being taken not to splash the leaves, provides a safe remedy.

KŘÍŽ (J.). **Přenos kadeřavosti a nakažlivé neplodnosti Chmele na potomstvo semenem.** [Transmission of curl disease and infectious sterility of Hops to the progeny through the seed.]—*Ann. Acad. tchécosl. Agric.*, **32**, 7, pp. 951–970, 4 pl., 19 fig., 1959. [Russ., Germ. summ. Abs. in *Landw. Lit. Tschechosl., 1959*, 3, p. 57, 1959.]

Seed transmission of curl disease [? str. hop nettle head virus: **30**, 76] was found responsible for only approx. 10% of incidence in seedlings. Infectious sterility [hop nettle head virus] in seedlings was likewise largely inherited from diseased mother plants (av. 80%, and up to 91% if such mother plants had been pollinated from an infected pollen parent) and developed even if the symptoms in the mother plants were weak or indistinct. With rising intensity of the symptoms the susceptibility to *Peronospora* [*Pseudoperonospora humuli*] increased.

HOLLIDAY (P.). **Suspected virus in Black Pepper.**—*Commonw. phytopath. News*, **5**, 4, pp. 49–52, 3 fig., 1959.

Virus-like symptoms present on *Piper nigrum* in Sarawak were reproduced 14 days after approach grafting 18-in. high healthy and diseased rooted cuttings. In the field 2 types of symptom were recognized: severe stunting with acute, extensive chlorosis, especially of the young leaves, and fleck necrosis, curling, narrowing, and reduction in size of young and mature leaves; and a milder, broad patterned, chlorotic mosaic.

The severe type is at first restricted to a few young leaves, spreading later; thus of 53 vines with approx. $\frac{1}{4}$ or less of their leaves showing symptoms in 1958, 49% had $\frac{1}{2}$–$\frac{3}{4}$ affected 1 yr. later. Initially, spread between plants seems slow. Symptomless vines $3\frac{1}{2}$ yr. old had a mean height of 3·1 m., while those of the same age, with severe symptoms, were only 2·47 m. The disease caused a 27–43% reduction in yield in 1 yr. Similar symptoms have been noted by the writer in Indonesia, and occur apparently in Laos and Vietnam [**32**, 510].

Theis (T.), Calpouzos (L.), Gregory (L.), & Almeyda (N.). **Thread blight disease of Black Pepper in Puerto Rico.**—*F.A.O. Pl. Prot. Bull.*, 7, 12, pp. 161–162, 1 fig., 1959.

A thread blight of *Piper nigrum* [cf. 7, 676] caused by *Pellicularia koleroga* occurred during 2 successive yr. in experimental plantings near Mayaguez, Puerto Rico, causing defoliation and fruit drop, and symptoms resembling those on coffee [cf. **38**, 367]. Infection was most prevalent from July–Oct. and on abundant vegetative growth in densely shaded places, though plants in full sunlight were also attacked. Excellent control resulted from 2 applications of Bordeaux mixture (5–5–50), 3 weeks apart, and a yr. later from the use of copper A, applied similarly. Thorough spraying of the interior parts of the plant is essential.

Thomas (C. A.), Rubis (D. D.), & Black (D. S.). **Development of Safflower varieties resistant to Phytophthora root rot.**—*Phytopathology*, **50**, 2, pp. 129–130, 1 fig., 1960.

Vars. resistant to root rot caused by *P. drechsleri* [cf. **31**, 632] have been developed by U.S. Dept Agric. and Arizona agric. Exp. Sta., Tucson, testing being carried out in the greenhouse and field. Resistance, which appeared to be dominant, was transferred by backcrossing. Gila, released in 1958, proved superior in yield to the susceptible Nebraska 10; B7–398-1 showed promise in preliminary tests.

Türkmenoğlu (Z.) & Ari (O.). **Ege bölgesi Susamlarında görülen bir virus hastalığı-phyllody virus.** [A virus disease—phyllody virus –noted on Sesame in the Aegean region.]—*Bitki Koruma Bülteni* (*Pl. Prot. Bull.*), **1**, 2, pp. 12–17, 4 fig., 1959. [Engl. Germ. summ.]

It is reported from the Bornova agric. Disease Control Inst., Turkey, that sesame phyllody virus [cf. **36**, 211] has been noted sporadically in recent years on local sesame vars. in W. Turkey. Foreign vars. imported in 1957–59 were up to 50% infected, but local vars. growing nearby proved nearly resistant. Other symptoms such as severe distortion, fasciation, and leaf crinkle have appeared in the imported vars., and have not been diagnosed with certainty. Destruction of the diseased plants is advocated.

Sabet (K. A.) & Dowson (W. J.). **Bacterial leaf spot of Sesame (Sesamum orientale L.).**—*Phytopath. Z.*, **37**, 3, pp. 252–258, 3 fig., 1960. [Germ. summ.]

In the Sudan there are 2 types of leaf spot on sesame [**34**, 137] both known as 'Marad ed Dum' and widespread. One kind is small dark red-brown to black and develops on the stems and capsules as well. The other is much larger, light brown and not usually on the stems and capsules. From the former type *Xanthomonas sesami* Sabet & Dowson was isolated at the Fac. Agric., Univ. Khartoum, which reproduced the disease on field-grown sesame in the Sudan and on potted plants at the Botany School, Cambridge, under humid conditions. It differs from *X. phaseoli* and *X. malvacearum* in being confined to sesame, in its slow action on starch, which the other bacteria hydrolyse in 5 days, in its ability to liquefy Löffler's blood serum, in its moderate growth on potato plugs compared with the luxuriant growth of the other 2 spp., and in some other minor characters. The

sesame bacterium produces acid from mannitol, which is not utilized by *X. malvacearum*.

From the 2nd light-brown type of leaf spot no pathogen could be isolated, it is probably due to rain damage.

LEPPIK (E. E.). **World distribution of Cercospora traversiana.**—*F.A.O. Pl. Prot. Bull.*, **8**, 2, pp. 19–21, 1 fig., 1 map, 1959. [10 ref.]

From the Pl. Introduction Service, Iowa State Univ., Ames, the author records that *C. traversiana* causing leaf spot of *Trigonella foenum-graecum* [cf. **14**, 529; **36**, 530] has lately reached several E. European countries and S. America from the Near East and India. It has also been introduced into the United States with seed samples from Ethiopia and E. India. The disease, of considerable economic importance, attacks the leaves, stems, young pods, and seedlings, damaging the plants before they ripen; at Ames almost 70% were killed in moist, greenhouse conditions, though adequate ventilation reduced losses.

C. traversiana is seed-borne (though not easy to detect) and systemic. During germination it produces abundant conidia on the testa, which grow vigorously in cold, moist air. The 1st symptoms usually appear as large spots on leaves and stems during and after anthesis, when the disease spreads. Soon the young pods become infected and the fungus invades the immature seeds, which are not killed though the fungus overwinters on them. Distribution records are tabulated and mapped.

OKSENT'YAN (U. G.). О микрофлоре сосудистого пучка корня Кок-сагыза при «сосудистом бактериозе». [On the microflora of the vascular bundle of the Kok-saghyz root in 'vascular bacteriosis'.]—Труд. всес. н.-и. Инст. сел.-хоз. Микробиол. [*Trud. vses. n.-i. Inst. sel.-khoz. Mikrobiol.*], *1958*, 15, pp. 260–270, 1958. [Abs. in *Referat. Zh. Biol.*, *1960*, 1, p. 186, 1960.]

The presence of specific phytopathogenic bacteria in the brown stele of kok-saghyz [*Taraxacum kok-saghyz*] roots was shown by numerous analyses of infected roots at the Inst. of Rubber-producing Plants, Moscow region, and from other regions of the U.S.S.R. *Pseudomonas fluorescens liquefaciens* [cf. **39**, 82], predominant of the saprophytes, did not occur in healthy unbrowned steles. Cultures differed from typical ones in their ability to macerate plant tissue and to cause rotting of green kok-saghyz plants and pieces of root in the laboratory. *P. fluorescens liquefaciens* is present in the soil and on the seed, but inoculation of seeds did not reproduce the disease. It was possible to induce browning of the root vascular system experimentally only by mechanical damage and by increased humidity and soil temp.

McWHORTER (F. P.). **Report to the Government of the Philippines on the cadang cadang disease of Coconut.**—14 pp., 4 pl., Rome, F.A.O. (Rep. No. 1107/59/7/5492), 1959. [Mimeographed.]

Investigations were carried out in the Philippine Islands from 18 Mar. 1958–25 Apr. 1959, to determine *inter alia* current views on the disease [cf. **34**, 92; **38**, 23; **39**, 121, 335], its relation to other coconut diseases, symptoms, transmission, and control. The disease is probably caused by a virus. W. C. PRICE has stated (F.A.O. Rep. 850, 1958) that cadang-cadang is distinct from any coconut disease found in other countries [cf. **35**, 181]. 'Porroca' disease in Colombia always causes a speckling of brown, decaying fibres in wilted fronds and peculiar white, soft spots within the trunk.

The upper strands of the so-called 'tertiary feeder roots' of coconuts affected by cadang-cadang break down rapidly in the early stages of the disease. The terminal leaves remain erect and are dark green, much greener than the lower, spotted leaves. The erect fronds are of a normal shape, but slightly shortened. The specialized

metabolism within young fronds and the lack of well-formed chloroplasts may, it is suggested, inhibit the formation of the causal agent and preclude the development of typical symptoms until metabolism and cell differentiation are directed specifically towards photosynthesis. The formation of typical cadang-cadang spots relates to necrotic, not chlorotic, processes. The protoplasts of chlorenchyma cells are transformed by 'white-cell necrosis', typical of virus infections, into homogeneous white masses which account for the translucent nature of the spots. In the centre of these the epidermal cells are killed and the injured stomata remain slightly open, so that affected leaves lose water more rapidly than normal ones.

In Mar. 1959, S. of Legaspi, near barrio Cauayan, large plants of *Pandanus coplandii* in a coconut plantation devastated by the disease showed symptoms of cadang-cadang. A nutritional origin of the condition has been disproved by experiment and by circumstances: the disease occurs on more than 46 types of soil and has developed yearly over 40 yr. in an expanding pattern over an area 400 km. long. All attempts at transmission to numerous likely alternative hosts by mechanical inoculation failed. A selection programme for possible resistance has been initiated [see below].

McWhorter (F. P.). **Coconut cadang-cadang disease. Investigation project report by the FAO virologist to the Philippine Government (August to December, 1958.)**—*Araneta J. Agric.*, **6**, 1, pp. 13–23, 1959.

A long-range general plan is presented to enable the Philippines to continue as important producers of copra through the immediate implementation of control measures based on the breeding of resistant vars. [see below] and the prevention of spread by planting in areas where the incidence of infection is low, and the subsequent adoption of other methods; plantation management procedures; and prolongation of the economic life of affected palms by hormones, e.g. gibberellin, cytovirin, and certain chemicals, and fertilizer combinations.

Mendiola (N. B.). **The necessity of selecting cadang-cadang resistant varieties or strains of Coconut or of creating Cocos hybrids.** -*Araneta J. Agric.*, **6**, 1, pp. 24–32, 7 fig., 1959.

A discussion of the steps to be taken in connexion with the above-mentioned project [see above] is supplemented by an annex in which the introduction of different spp. of *Cocos* and foreign and local coconut vars. is suggested and an outline given of tests for resistance to cadang-cadang [**37**, 549] and other characters. The most promising of the *C.* spp. which it is proposed to introduce from Brazil and elsewhere is *C. botryophora*, which is reasonably tall in contrast to the low stature of the others and yields large nuts.

Seventh Annual Report of the West African Institute for Oil Palm Research, 1958–1959.—140 pp., 3 col. plans, [? 1959.] 2*s.* 6*d.*

In the report [cf. **38**, 327] of the plant nutrition division (pp. 85–99) R. A. Bull records that macronutrient deficiency symptoms were experimentally induced in seedling oil palms, but the experiment was terminated after about 6 months, when irregular, white or yellowish spots or streaks, the origin of which could not be established, began to appear on the leaves of almost all the seedlings.

In a pot experiment in which seedlings susceptible to orange spot [**37**, 366 *et passim*] received (*a*) 10 different levels of Mn and (*b*) 10 different levels of Cu in a basal nutrient solution lacking these elements and K, lesions resembling those of orange spotting appeared on the older leaves of all the seedlings, including those with complete nutrient, but were most conspicuous on palms given 12·8 Mn p.p.m. [6·4 in table] and also on those given 0·16 Cu p.p.m. While the results are

inconclusive, it is evident that the orange spot symptom can be produced in sand culture. The disorder may be a sign of premature leaf senescence, which often characterizes K deficiency. A sp. of *Pestalotiopsis* isolated from affected leaves proved non-pathogenic.

Micronutrient deficiency symptoms produced experimentally are described; they showed that B deficiency can produce a condition resembling 'little leaf' [**39**, 185].

J. S. Robertson of the plant pathology division (pp. 99–104) states that in spraying trials conducted over a period of 4 yr. against freckle (*Cercospora* [*elaeidis*]) a particular formulation of ziram no longer manufactured was the most effective material tested. Orthocide 50 W (found effective in the Belgian Congo) was then used for routine nursery spraying, while being tested in the field against ziram. In the 1st trial the results did not appear to justify changing the policy of spraying at the rate of 2 lb./100 gal. every 3 weeks. In a further trial orthocide, ziram, and phaltan 50 W were more effective than perenox.

Against anthracnose [**36**, 468] spraying at regular intervals of 2 weeks with captan 2 lb./100 gal. together with improved raised-tray practices reduced the disease to negligible importance.

A survey showed that when planting was done in late Aug., mid-Sept., early Oct., late Oct., and early Nov. the percentages of blast [cf. **39**, 184] were 19·5, 18·49, 11·2, 4·67, and 0, respectively. Incidence was also significantly reduced by a soil application of santobrite [cf. **33**, 546] at 25 lb./acre.

All attempts to transmit the 'ring spot' condition [**38**, 328] by insects or mechanically were unavailing.

Robertson (J. S.). **Co-infection by a species of Pythium and Rhizoctonia lamellifera Small in blast disease of Oil-Palm seedlings.** –*Trans. Brit. mycol. Soc.*, **42**, 4, pp. 401–405, 1 pl. (4 fig.), 1959.

Further details are given of information noticed from elsewhere [cf. **39**, 184]. Typical blast symptoms were induced only when a mixed inoculum of the two fungi was used.

Calcat (A.). **Diseases and pests of Date Palm in the Sahara and North Africa.**—*F.A.O. Pl. Prot. Bull.*, **8**, 1, pp. 5–10, 2 fig., 1959.

Writing from the Service de l'agriculture et du paysanat du Sahara, Paris, the author presents notes on diseases of non-parasitic origin as well as on 'bayoud' (*Fusarium oxysporum* var. *albedinis*) [cf. **36**, 586], 'khamedj' or inflorescence rot (*Mauginiella scaettae*) [cf. **38**, 23], and 'belaat' (*Phytophthora* sp.) [**12**, 626], of rare occurrence.

Keller (E. R.). **Bericht über die Hauptversuche mit mittelfrühen Speisekartoffelsorten 1956–1958.** [Report on the principal tests of medium early Potato table varieties 1956–58.]—*Mitt. schweiz. Landw.*, 7, 11, pp. 164–174, 1 graph, 1959.

Two of the 3 potato vars. tested by the Eidg. Landw. Versuchsanst., Zürich, qualified for inclusion in the Swiss official list [**38**, 95]. Fina proved more resistant to haulm blight and tuber rot (*Phytophthora infestans*) than Bintje, showed a certain tolerance of leaf roll virus, but was susceptible to potato virus Y. Lori [**38**, 417] was slightly susceptible to *P. infestans* and remarkably tolerant of leaf roll virus. Both vars. proved resistant to wart [*Synchytrium endobioticum*].

Zaleski (K.) & Książek (D.). **Obserwacje nad chorobami wirusowymi Ziemniaków i doświadczenia z przenoszeniem się wirusów na drodze mechanicznej.** [Observations on the virus diseases of Potatoes and experiments on the mechanical transmission of viruses.]—*Acta agrobot.*, **8**, pp. 11–47, 1 fig., 1 diag., 1959. [Engl. summ. 38 ref.]

At the Poznań Institute of Phytopathology WSR, and Gorzów Wielkopolski core

grafting proved more effective than half-tuber grafts for the transmission of potato leaf roll, the mosaic group, potato [beet] curly top [str.], potato streak (potato virus Y), 'group V' viruses which have not been clearly distinguished yet, potato witches' broom, potato yellow dwarf, and potato spindle tuber viruses, but transmission was obtained only within but not between different vars. Symptoms were less marked in the inoculated plants than in the infectors. Av. tuber yield in Poznań was 0·627 kg. healthy plant and 0·513 kg./infected plant, a decrease of 18–45%, while in Gorzów the decrease was 25–83%. Here also mixed infections resulted in lower tuber yields than single virus infections (56% compared with 44%) [cf. **37**, 368].

Da Cunha (Maria I. S.). **O 'enrolamento' da Batateira e formas de o combater.** [Leaf roll of Potato and methods for its control.]—*Agricultura* (*Rev. Direc. Serv. agríc.*), *Lisboa, 1959*, 3, pp. 39–40, 1 fig., 1959.

A summary of essential information on the virosis, with special reference to its occurrence in Portugal [**11**, 68] on the widely cultivated var. Arran Consul and the possibilities of control by a planting scheme designed to avoid coincidence between the periods of crop growth and those of multiplication of the aphid vector [*Myzus persicae*].

Benson (A. P.) & Hooker (W. J.). **Isolation of virus X from 'immune' varieties of Potato, Solanum tuberosum.**—*Phytopathology*, **50**, 3, pp. 231–234, 1960. [18 ref.]

Further details are given from Mich. State Univ., E. Lansing [**37**, 551]. Virus X was isolated very infrequently from all the plant parts tested (root system, areas immediately below the graft union, stem sections below the soil line, and from necrotic tubers developing subsequently, but not, however, from plants grown from these tubers nor from leaves of highly resistant vars. acting as stock. Isolations were more frequent and consistent from S.41956 and Tawa than from Saco. Incubation periods in *Datura tatula* [see below] were 5–23 days.

Hooker (W. J.) & Benson (A. P.). **Time of symptom response in Datura tatula L. to Potato virus X as a function of virus concentration.**—*Virology*, **10**, 2, pp. 245–256, 1 graph, 1960.

At the Dept Bot. and Plant Path., Mich. State Univ., E. Lansing, when leaves of *D. tatula* were inoculated with serial dilutions of potato virus X [see above] in highly purified suspension or in clarified sap, the time required for symptom development increased with the dilution of the inoculum, sometimes being as much as 22 days. There was a similar delay when very restricted areas of leaf were inoculated. The delay resulting from dilution of the inoculum was less pronounced at high temp. With dilute inoculum the variation in incubation period between individual plants was considerably greater than with conc. inoculum. In 2 tests in which known quantities of the virus were inoculated into leaves of *D. tatula* and *Gomphrena globosa* [cf. **39**, 186] the former was approx. 100 times more sensitive.

Watson (Marion A.). **Evidence for interaction or genetic recombination between Potato viruses Y and C in infected plants.**—*Virology*, **10**, 2, pp. 211–232, 12 fig., 1960.

In a further note from the Rothamsted exp. Sta. on the combined, possibly 'hybrid' infections with potato virus Y (PVY) and potato virus C (PVC) [str. of potato virus Y] in *Nicotiana glutinosa* [cf. **38**, 651], it is stated that in President and Craigs Snow White potato plants necrotic lesions develop as in Majestic. Combined infection led to systemic infection, as for PVY, but unlike PVC, following manual inoculation, but the symptoms resembled those produced by PVC transmitted to these same

vars. by grafting. Many isolates from local lesions resulting from mixed infection were like PVC, and a few like PVY. Isolates from systemically infected parts less often gave symptoms like those of PVC, and many gave mild mottle with no necrosis.

Three known PVC-like viruses resembling the isolates from mixed infection are PVC^n, an aphid-transmissible virus [**36**, 551]; PVC^{niab}, occurring in International Kidney potatoes in Jersey; and a virus in *Solanum jasminoides* in India [**38**, 523]. These viruses do not usually invade potato vars. systemically, but occasionally yield isolates which do so. The symptoms which occur when they do invade resemble those caused by the combined isolates from *N. glutinosa*. The isolates in question often appear genetically unstable, though the viruses from which they were derived are either stable in potato, or, as with PVC^n, revert to a form even closer to PVC.

The nature of the interaction between PVC and PVY is unknown, but a likely explanation is that particles are formed which carry genetic determinants from both viruses.

HUNNIUS (W.). **Über das Stengelbuntvirus der Kartoffel.** [On the stem mottle virus of Potato.]—*Bayer. landw. Jb.*, **36**, 6, pp. 730–733, 1959.

In a general note from the Landessaatzuchtanstalt, Weihenstephan, it is stated that heavy infection of potato by stem mottle virus [**37**, 245; **38**, 479; **39**, 221] gives symptoms closely resembling those of potato bouquet virus [cf. **34**, 245; **37**, 463], while with light infection the characteristic symptom is a yellow flecking. In recent years deformed and yellow-flecked plants have been seen in increasing numbers, and special care should be taken to eradicate them from the seed crop.

Report of the Working Party on Potato wart disease races.—15 pp., 1 pl. (4 fig.), Paris, European and Mediterranean Plant Protection Organisation, 1960. [With Fr. version.]

The position created by the presence of new races of *Synchytrium endobioticum* [cf. **39**, 121] was examined and suggestions made to limit their spread. The few races so far discovered have spread very little during the past 20 yr. The restriction of main crop vars. to those resistant to the common race of *S. endobioticum* in Czechoslovakia and E. and W. Germany probably explains why new races have been recorded only in these countries; the presence of such races elsewhere may not have been noticed. In E. Germany legislation is contemplated which will permit the planting only of vars. resistant to the biotype responsible in parishes where an outbreak has occurred and compel growers to make some 500 sq. m. of an infected field available for a var. test to determine the race responsible. Potatoes grown in affected fields will be moveable only under licence and their use, until steamed, forbidden.

New races probably exist outside Europe, though they have not yet been detected. Extremely virulent races must exist in Newfoundland [cf. **37**, 554] because several vars. immune in Great Britain have been heavily infected in their 1st season when introduced from Scotland.

The offer of collaboration made by Germany should be accepted and the testing of suspected new races detected in any part of Europe centralized until other countries possess similar facilities. It is recommended that when a resistant var. is found to be infected a sample, with full particulars, and a few healthy tubers should be sent either to the Biologische Bundesanstalt für Land- und Forstwirtschaft, Messeweg 11/12, Brunswick, W. Germany, or the Biologische Zentralanstalt Berlin, Stahnsdorfer Damm 81, Berlin-Kleinmachnow.

ULLRICH (J.). **Untersuchungen zur Beurteilung der Resistenz von Kartoffelsorten gegenüber Synchytrium endobioticum (Schilb.) Perc.** [Studies on the assess-

ment of the resistance of Potato vars. to *S. endobioticum*.]—*Phytopath. Z.*, **37**, 3, pp. 217–235, 11 fig., 1 graph, 1960. [Engl. summ.]

Infections on potato vars. inoculated with *S. endobioticum* [**38**, 764] at the Inst. für Botanik, Brunswick, Germany, were dense, scattered, or isolated when the resistance of the var. was low. In vars. of medium resistance infections were never dense, and in highly resistant vars. they were only isolated. The reactivity is independent of this differential infection density. Thus vars. of low resistance can react with an intense production of tumours (e.g. Deodara), or tumours may be reduced (Roode Star) or absent (Urgenta). Vars. of medium resistance can also react strongly with tumour formation and can form tumours occasionally in the field in spite of their low density of infection, e.g. Virginia. In all these there is the danger of resting spores being formed. Hence, 'border line' types, such as Roode Star, Urgenta, and Virginia, should not be cultivated [cf. above]. With Virginia and the like there is the further danger that the occasional occurrence of tumours may give the impression of the existence of new races of the pathogen.

Pidoplichko (N. M.) (Editor). Рак Картофеля. [Potato wart.]—168 pp., 20 fig., 4 diag., Kiev, Ukrainian Academy of Sciences, 1959. [6 pp. ref.]

The Proceedings [cf. **38**, 616] of the Conference held in Kiev, U.S.S.R., in April 1957 began with an account of the influence of ecological conditions upon the spread of potato wart (*Synchytrium endobioticum*) by N. M. Pidoplichko (pp. 7–15). Z. F. Kryachko (pp. 16–24), reporting on its distribution and present control in the Ukraine [cf. **38**, 418], mentioned, *inter alia*, its incidence in the Zhitomir, Kiev, Khmel'nik, and Chernigov regions and estimated the infested area at 6,241 ha. P. A. Khizhnyak (pp. 25–29) [cf. **38**, 618] dealt with the problem of *S. endobioticum* biotypes [cf. above] and their pathogenicity to a diversity of vars. and pointed out that in the Ukraine unsatisfactory results from resistant vars., including Kur'er, Maĭka belaya, Majestic, Yubel', Parnassiya, Karnea, and Priska, were due to their contamination (as much as 20% in 1956) by susceptible vars.

B. I. Bershteĭn & A. S. Okanenko (pp. 30–44) discussed the differences between healthy and infected plants in respect of N metabolism. Four sprays with 0·05% malachite green induced 50–70% wt. increase of the tubers, concomitant with wart growth in infected plants, and a perceptible rise of carbohydrates. The report by D. V. Lipsits (pp. 45–58) has been noted [**39**, 187]; there was an increase of radioactivity on introduction of [labelled] Na_2SO_4, thiourea, and methionine; introduced vitamin B_1 was transferred predominantly to the roots. The rapidity of protein restoration and synthesis in wart tissues, higher than elsewhere, was associated with the rate of inclusion of methionine. T. A. Reĭngard (pp. 59–66) in his contribution on P. metabolism stated that wart growths contained more P than healthy tissues, especially in their peripheral zones, and that plants fed with radioactive P^{32} accumulated larger quantities in the warts than elsewhere. S. I. Pashkar' (pp. 67–73), speaking on the effect of wart upon the composition of the polyphenols [cf. **38**, 617], noted the results of chromatographic analyses of potato tissues, suggesting that in resistant vars. the mechanism enabling intensive synthesis of chlorogenic acid, indispensable for wart, is absent, initial infection being checked [cf. **39**, 187] by local accumulation of caffeinic acid. A brief paper by D. V. Lipsits (pp. 74–79) on vitamin C content reported that both dry matter and ascorbic acid [loc. cit.] were reduced in affected tubers but the quantity of the former in proportion to the latter was higher in warts. T. A. Reĭngard and S. I. Pashkar' (pp. 80–87) discussed the contents of growth substances of the auxin type in potato, which in healthy plants tended to be concentrated in reproductive organs and young stolons, and in infected plants in warts, particularly in their peripheral zones.

A. I. Tereshchenko (pp. 88–97) reported on the selection of resistant vars.

[**39**, 438] at the Nemeshaev Exp. Sta. Good results were obtained from Katyusha, which gave a higher yield than Grentsmark or Yubel' and was also resistant to a number of other parasites, and from Chetÿrekhsotka and Borodyanskii (both crosses of Fryumelle and the hybrid *Solanum andigenum* × Centifolia × Katahdin × Oktyabrenok). Five other resistant vars. at the stage of trials are Belaya Roza 728c/51 (Priekul'skiĭ ranniĭ × Katahdin), 4333 c/47 (Berlikhingen × 1226 = 281), 4308 c/47 (Berlikhingen × Mittelfrühe), 665 c/50 (Fridolin × Polesskiĭ × Priekul'skiĭ ranniĭ), and 2829 c/47 (Korenevskiĭ × C. 166). Mme L. P. SALTŸKOVA (pp. 98–107) reviewed the results of potato wart control from the 4 main research stations [loc. cit.] and a number of selection institutions in 1954–56. Mme V. I. YAKOVLEVA'S contribution (pp. 108–117) summarized the results of 3 yr. observation of wild and cultivated spp., vars., and forms. The wild spp. *S. molinae*, *S. leptostigma*, *S. catharthrum*, *S. gibberulosum*, *S. schickii*, and *S. boergeri* produced progeny with 75–95% resistance to potato wart, while reproduction by self-pollination reduced the resistance by a half or more. A. A. ZUBCHENKO (pp. 119–133) noted an increasing use of wart resistant vars., which in 1952 amounted to 52·6% of the total of other vars. grown, compared with only 12·8% in 1947. Cultivation of the most widely used resistant var. Parnassiya rose from 6,675 ha. in 1947 to 100,944 ha. in 1956.

The use of X-ray fluorescence for determination of varietal differences was again reported on by Mme V. I. SADOVNIKOVA (pp. 129–133). Crop rotation [cf. **38**, 419] as a method of disinfestation of soil was dealt with by P. A. KHIZHNYAK (pp. 134–139): in 1 trial the fungus was entirely exterminated in a rotation of table beet, resistant potato, fallow, and winter wheat. Fallow soil always freed itself substantially from the pathogen, while perennial grasses and clover aided its retention. Deep tillage was useful; it is inferred that the translocated spores perish from lack of nutrient substrate at the depth of the potato roots. A survey by K. SAZONIK and D. B. ROZENBERG (pp. 140–145) of fungicides included a special consideration of chemicals applied in orchards where potatoes are grown, as the fungicide (chlorpicrin) most widely used on potatoes is phytotoxic to fruit-bearing plants. For this purpose lime-sulphur 15° at 21 l./sq. m., ashes [not specified] at 15 kg./sq. m., air-slaked lime at 10 kg./sq. m., 10 or 20% 'deémul'gator' or 'kozhémul'gator' at 10 l./sq. m., and 15% heavy pyridine bases at 10 l./sq. m. were particularly effective. Susceptible potato vars. grown in infested soil dressed in the preceding year with calcium cyanamide, 1 ton (1,000 kg.)/ha., incurred about 50% infection, but with 2·5 ton/ha. and higher concs. they remained entirely free; no harm to adjacent apple trees resulted. This information was supplemented by K. SAZONIK (pp. 146–153), who supplied some data concerning sterilization of soil in the Ukraine, where chlorpicrin at 250–300 ml./sq. m. is the most common disinfectant (94·1% of the soil treated), usually applied 10–12 cm. deep by hand-injectors; also 10–15% formalin at 10 l./sq. m.; and 5–6% solution of caustic soda at 15 l./sq. m. Chlorpicrin dressings in autumn were 4·35–19·9% more effective than in summer. E. A. GEGERMAN (pp. 154–167) in his closing address dealt with the pathogenicity of the parasite to other hosts [cf. **9**, 124], including tomato, *S. nigrum*, *S. dulcamara*, and wild potato, inoculation of which was effected through direct contact of growing points with small particles of wart growths or through soil infested by resting sporangia. The 1st symptoms, yellowish-green outgrowths 0·2–0·3 mm. in diam. on leaves, and in tomato also on stalks, often develop into warty formations. Some tomato vars. are totally resistant, others are susceptible only to initial infection, others again are attacked severely, the pathogen also affecting buds and causing sterility.

VLADIMIRSKAYA (Mme N. N.). Жизнедеятельность **Synchytrium endobioticum (Schilb.) Perc.** в стадии покоящихся зооспорангиев. [Life activity of

S. endobioticum at the resting zoosporangia stage.]—*Bot. Zh. S.S.S.R.*, **45**, 1, pp. 97–104, 1 pl., 2 fig., 1 graph, 1960.

Laboratory and field observations by the Leningrad sci.–res. Sta. for Potato Wart, using vars. Vale, 18883 (Moskvich), Épron, Rannyaya Roza, and Vol'tman, showed that some resting sporangia in warts [cf. above] germinated and released zoospores during what would normally be the 'resting' period, i.e. in field plants in the 1st year of the life cycle. In the 2nd year the rate of germination of the overwintered zoosporangia appeared dependent on the time of the year: when placed on the soil in Feb., Apr., and May, they began to germinate after 54, 12, and 3 days, respectively, and reached the percentage peculiar to the season, i.e. 32–33% in early June, 62–63% in mid-July, and 85–90% in Aug. In the laboratory 4% of the zoosporangia, distinguished by their coarse-grained structure, germinated only in the 3rd year, and they are believed to maintain the resting stage for even longer in the field.

Wenzl (H.). **Ökologische Grundlagen des Kartoffelkrebs-Vorkommens in Österreich.** [The ecological basis of the occurrence of Potato wart in Austria.]—*Ann. Acad. tchecosl. Agric.*, **32**, 6, pp. 79–90, 4 maps, 1959. [Russ., Engl. summ.]

This work has already been noticed [**38**, 28].

Stephan (S.). **Untersuchungen über die Witterungsabhängigkeit der Stärke des Krautfäuleauftretens.** [Studies on the relationship between weather and the intensity of Potato blight infection.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F., **13**, 12, pp. 226–230, 1959. [Russ., Engl. summ.]

Study at the Biologischen Zentralanstalt, Berlin, of data provided over several years by the Pflanzenschutzmeldedienst indicates that in the Magdeburger Börde and Western Mecklenburg [cf. **39**, 188] epidemics of *Phytophthora infestans* are to be expected when the total monthly rainfall during June-Aug. is av. or above av. for at least 2 successive months, provided that the temp. during the period is not very low.

Lowings (P. H.) & Acha (Isabel G.). **Some factors affecting growth of Phytophthora infestans (Mont.) de Bary. I. P. infestans on living Potato leaves.**—*Trans. Brit. mycol. Soc.*, **42**, 4, pp. 491–501, 1 fig., 5 graphs, 1959.

Field experiments at the School of Agric., Univ. Cambridge, indicated that under some conditions high inorganic N or a preceding leguminous crop may increase the resistance of Majestic potato leaves to *P. infestans* [cf. **35**, 115] by slowing the growth of the parasite after invasion without affecting the rate of necrosis of the invaded tissues. In the glasshouse hyphal growth, measured from the point of initial infection on the leaf, increased in the upper leaves after the onset of senescence: hyphal development was more rapid in excised leaves maintained in water than in intact leaves, but the difference was reduced in plants becoming naturally senescent. High N nutrition may delay the development of susceptibility by delaying senescence, chemical changes during which may influence nutrition and growth of the parasite independently of toxins liberated during cell necrosis.

Galindo A. (J.) & Gallegly (M. E.). **The nature of sexuality in Phytophthora infestans.**—*Phytopathology*, **50**, 2, pp. 123–128, 3 fig., 1 diag., 1960. [16 ref.]

In further studies at W. Va agric. Exp. Sta., Morgantown [cf. **37**, 676], to trace the origins of the gametangial hyphae of 2 mating types (A^1 and A^2) of *P. infestans*, a block about 4 mm. thick from a single-zoospore V-8 agar culture of each was placed on L-shaped pieces of Al foil on a slide; in the vertical side of the foil were up to 10 needle-point holes/80 sq. mm. in 2 rows, one near the top and the other

near the bottom. A block of water agar separated the perforated sides. Hyphae grew from the V-8 blocks, through the holes and met in the water agar. Nine isolates of A[1] were paired in all combinations with 3 of A[2] and it was possible to trace the oogonial and antheridial hyphae.

It appeared that each isolate was bisexual [hermaphrodite] and that the mating types, so-called, were in fact compatibility types, within each of which there were relative degrees of maleness and femaleness; individual isolates acted as male, or female, or as both in different pairings, though in some isolates male tendencies predominated and in others female. Reaction of an isolate apparently varied with change in vigour; when compatible isolates of equal sexual strength were paired, but one or other was starved (by growing a long way through the water agar) this isolate acted as male.

Bazán de Segura (Consuelo). **Búsqueda de fuentes de resistencia en Papa al hongo Verticillium albo-atrum.** [Search for sources of resistance in Potato to the fungus *V. alboatrum.*]—*Inf. Estac. agríc. La Molina*, **33**, 378, pp. 1–7, 1959.

In preliminary tests in Peru 16 of the 95 local vars. of *Solanum andigenum* and 8 of the 18 hybrids inoculated with *V. alboatrum* [**38**, 766] proved resistant.

Znamenskaya (Mme M. K.). Протравливание Картофеля против ооспороза. [Treatment of Potato against oosporosis.]—Защ. Раст., Москва [*Zashch. Rast., Moskva*], **5**, 1, pp. 48–49, 1 fig., 1960.

Losses of seed potatoes in the Murmansk region during the last 5 yr. from infection by *Oospora pustulans* [**39**, 343] were Snezhinka No. 3 5%, Murmanskiĭ 11%, Imandra 26%, Sestra Imandrȳ 25%, and Pilot 37%. In some yr. up to 60–80% of the tubers had to be rejected. Infection is highest in light sandy soils, weaker in humus iron podzols, and negligible in peat-bog soils. In tests at the Arctic exp. Sta. All-Union Inst. for Plant growing, Khibinȳ, instant and 5 min. dips 1–3 days after lifting in NIUIF-1 (1:400; basic solution containing 1·3% ethylmercury phosphate) resulted in 0–1% medium infection in Imandra, Pilot, Sestra Imandrȳ, and Murmanskiĭ, the figures for untreated tubers being 11–27% medium and 3–28% severe infection. In 1956 dusting with thiram gave improvement.

Manturova (Mme I. M.). Ооспороз Картофеля на Крайнем Севере. [Oosporosis of Potato in the Far North.]—Защ. Раст., Москва [*Zashch. Rast., Moskva*], **5**, 1, pp. 49–50, 1 fig., 1960.

The wide dissemination of oosporosis [*Oospora pustulans*: see above and below] in the Far North of U.S.S.R. is primarily due to the biological peculiarity of the fungus, the opt. temp. for the development of which does not exceed 11–12° [C.]. The immaturity of tubers from such areas with their soft and easily infected periderm and the long storage necessary are conducive to infection. Investigations at the Yamal'skaya agric. exp. Sta., Salekhard, Tiumen region, started in spring 1956, disclosed that the local var. Kur'er, which in the previous yr. occupied $\frac{3}{4}$ of the area under potatoes, was the most susceptible. In 1957–58 the new, higher-yielding selection Yamal'skiĭ was equally susceptible. In storage the top damp layer of tubers is most heavily infected. Even in conditions unfavourable for the fungus individual spores are preserved on the surface of the tuber for long periods. Under local conditions selections 18–21 with a thick rough periderm were practically non-susceptible. Storage conditions are also an important factor, infection being weak when small boxes of up to 10 kg. are used.

Manturova (Mme I.). Заболевание клубней Картофеля ооспорозом. [Infection of Potato tubers by oosporosis.]—Сел. Хоз. Сибири [*Sel. Khoz. Sibiri*], **5**, 2, p. 56, 1960.

Oosporosis [*Oospora pustulans*: see above], first noted at the Igarskaya and Yamal'-

skaya exp. Stas., is now also recorded in the Yamalo-Nenetskiĭ district. Tubers should be dried in the sun before storage, newly harvested tubers being treated with organic mercury preparations, e.g. 0·0025% NIUIF-1 solution, beforehand.

Dembskaya (Mme L. B.). ТМТД против ризоктониоза Картофеля. [Thiram against rhizoctoniosis of Potato.] —Защ. Раст., Москва [*Zashch. Rast., Moskva*], **5**, 1, p. 28, 1960.

In 1956 at the Novosibirsk State agric. exp. Sta. tubers of 4 potato vars. were dusted with thiram (7 kg./ton) against rhizoctoniosis [*Corticium solani*: **39**, 338] and common scab [*Streptomyces scabies*: cf. **38**, 620]. *C. solani* infection on Épron was 17% before planting and 15% in the autumn, as against 20% on untreated tubers; the corresponding figures for Sedov were 11%, 13%, and 24%; for Severyan 28% and 18% (no control); and for Udarnik 12% and 9% (no control). Scab on Épron was 15% before sowing, 10% in the autumn, and 16% untreated; Sedov 43%, 28%, and 46%; Severyan 27% and 19%; and Udarnik 39% and 9%.

Lowings (P. H.) & Ridgman (W. J.). **A spot-sampling method for the estimation of common scab on Potato tubers.**—*Plant Path.*, **8**, 4, pp. 125–126, 1959.

In a method devised at the School of Agric., Univ. Cambridge, infection by *Streptomyces scabies* [cf. **34**, 811] was estimated by means of a strip of transparent, flexible plastic marked centrally with a longitudinal line of dots, 1 mm. diam. and 8 mm. apart, numbered consecutively from a transverse line indicating 'zero' near one end. A random sample of potatoes is scored by looping the strip tightly round the long axis of each tuber and noting the no. of dots falling on scab lesions; this, expressed as a percentage of the total no. dots round the tuber, gives an estimate of the amount of scab round the long axis and, if the lesions are randomly distributed, of the percentage of the whole surface area affected.

Gottschling (W.). **Auswertung achtjähriger Feldprüfungen auf Resistenz gegen den Kartoffelschorf.** [Evaluation of 8-yr. field tests for resistance to Potato scab.]—*NachrBl. dtsch. PflSchDienst. Berl.*, N.F., **13**, 11, pp. 210–216, 2 graphs, 1959. [Russ., Engl. summ.]

At the Biologischen Zentralanstalt, Berlin, the 29 potato vars. permitted for cultivation in the German Democratic Republic varied appreciably in level of scab (*Streptomyces scabies*) [**38**, 24, 304] on the tubers in the experimental fields, though all were known to be equally infested. Comparison with meteorological data indicated that the infection level was determined primarily by soil temp., the highest resulting when long periods of warm weather, combined with sufficient soil moisture, occurred during tuber formation. Observation over a 4 yr. period is usually sufficient to permit a reliable estimation of scab resistance. In order, however, that all the vars. under test should get the max. chance of exposure to conditions opt. for infection it is proposed in future to plant individual replicates at 14-day intervals from mid Apr. to the end of May.

Perrault (C.) & Lachance (R. O.). **La dissémination de la flétrissure bactérienne des Pommes de terre dans le champ.** [The spread of bacterial wilt of Potato in the field.]

Génèreux (H.) & Lachance (R. O.). **Susceptibilité de variétés de Pomme de terre et d'espèces de Solanum à la flétrissure bactérienne.** [Susceptibility of Potato vars. and *Solanum* spp. to bacterial wilt.]

Duncan (J.), Génèreux (H.), & Couture (G. R.). **Indice de transmission de la flétrissure bactérienne par le doryphora.** [Indication of transmission of

bacterial wilt by Colorado Beetle.]—*Rep. Québec Soc. Prot. Pl.* **40** (*1958*), pp. 84–85, 86–87, 88–90. [Received 1959.]

At the Lab. Serv. Sci., Ste-Anne-de-la-Pocatière, Québec, leaves of healthy potato plants growing in the field adjacent to plants infected by *Corynebacterium sepedonicum* were lyophilized and pulverized and then each sample was diluted in a few ml. of water. After 2 centrifugations, the 1st to eliminate the vegetable debris, the 2nd to obtain a conc. suspension of bacteria, the roots of 4 young, healthy plants were dipped for 5–10 seconds in each sample and then replanted in individual pots and raised to maturity in a greenhouse. Only 2 of 150 samples contained bacteria in sufficient number to cause wilt but microscopic examination of the inoculated plants stained with Gram's iodine showed that 21 other samples contained the pathogen in smaller quantities.

Seed-piece inoculation of 24 potato vars. showed that the degree of infection of foliage and tubers did not correspond; tubers of the most resistant vars. [cf. **38**, 541] tolerated the bacterium without any visible symptoms. Of 10 spp. of Solanaceae inoculated only *S. demissum* and *S. cardiophyllum* developed symptoms in the greenhouse, but only *S. dulcamara* was free from bacteria.

Studies in which insects were caged with diseased and healthy potato plants, or plants were inoculated with powdered, dried preparations of the insects or of the plants on which they had fed confirmed that *Leptinotarsa decemlineata* is a vector of *C. sepedonicum* [**21**, 501].

Foucart (G.). **La bactériose de la Pomme de terre au Ruanda-Urundi.** [Bacteriosis of Potato in Ruanda-Urundi.]—*Parasitica*, **15**, 4, pp. 148–170, 1 fig., 3 graphs, 1959.

The only serious disease of potato in this district of the Belgian Congo is caused by *Pseudomonas solanacearum* [**38**, 382 *et passim*]. In each of 2 seasons the 1st infections became apparent during the 3rd 5-day period after emergence. The number of wilted plants at first increased rapidly, then fell off, and then increased again until incidence attained a max. With potatoes planted in Apr. 1958 the slow progress of the disease continued longer than with those of Oct. 1956. In potatoes which followed an earlier planting there was only 1 phase of infection, during which 86% of the plants became infected. The 1st phase depends on the disease potential, which in a crop planted on cleared land, in a rotation, is confined to infected seed-pieces. When, however, successive potato crops are planted in the same ground, soil contamination also becomes a factor.

Phases of rapid spread corresponded to periods of slow vegetative development, but no relationship was established between growth and the no. of plants infected. Further, no correlation was found between yield and susceptibility. The presence of free water in the soil favoured spread of the bacterium. Lesions produced on the tubers and roots by soil insects and during cultivation increased susceptibility. Other hosts of *P. solanacearum* found locally are tomato and tobacco. In 1 test, after 6 months' storage, losses of selected tubers from healthy plants amounted to 10–15% and from affected to 30–60%.

Control may be secured by rotation and the use of clean seed-pieces; spraying the foliage with antibiotics is considered of possible value as a curative treatment.

Vicente Jordana (R.). **Cytoarjesis in Potato Tubers. I. Fundamentals and Methods. II. Susceptibility of living Potato tissues to soft-rot: Effect of inoculum potential. III. Susceptibility of living Potato tissues to soft rot: Effect of humidity and temperature. IV. Importance of maturity of tubers and presence of sprouts on the arrest of infection.**—*Microbiol. esp.*, **11**, 1, pp. 1–23,

1 fig., 2 graphs; pp. 25–36, 1 graph; pp. 37–58, 3 fig., 4 graphs; **11**, 3, pp. 219–236, 11 fig., 1958. [Span. summ.]

I. From studies at Instituto de Edafologia Vegetal, Madrid (and Bot. Sch., Cambridge Univ.) of host-parasite relationships using potato tubers and *Erwinia carotovora* var. *aroideae*, and various other soft-rot bacteria and fungi, the author suggests that the active defence of the host against infection is of great importance in embryonic tissues and in those under the influence of meristematic tissue. Infection may be considered as a system of 2 components in which host resistance may be broken down by activity of the parasite. Conversely, development of the parasite could be arrested by activity of the host, and it might be expected that the whole system could reach a state of equilibrium. This phenomenon is termed cytoarjesis [cf. **37**, 651]. It refers particularly to the cell defence that develops during processes of cell synthesis, e.g. during bud formation in the tuber.

A study was made of the development of soft rot in potato tubers in different states of germinative activity, using methods which correlated the activity of both parasite and host and showed their interaction. Host activity was measured by weighing the buds that developed, and parasitic activity by weighing the soft-rotted tissue.

II. As actively germinating tubers proved very resistant peeled tubers were used to study the susceptibility of potato tissues to soft rot, using varied inocula. When inoculated with cultures of *E. c.* var. *aroideae*, differences in the rate of increase of soft rot with varied inocula were found at early stages of infection. Inocula grown under less suitable conditions became effective after a short period of dormancy and/or incubation, unless very inactive.

In III, peeled potatoes were again used to eliminate the effect of buds when the extent of rot and associated infection was a function of time and humidity; at low humidities soft rot may be arrested but other types of infection develop to some extent. Soft rot develops at 20–35° C.

IV. The experiments showed that the presence of buds is not the sole condition for opt. bacteriostatic effect. A special degree of maturity is required, brought about by holding the tubers at a suitable sprouting temp.; the important factor seems to be the time necessary for a diffusion factor to spread throughout the tuber. The critical influence of humidity on host and parasite is discussed.

[A summary in Spanish of this work appears in *Microbiol. esp.*, **12**, 4, pp. 423–438, 2 fig., 2 graphs, 1960.]

Hueck (H. J.), Ophuis (B. G.), & Hesen (J. C.). **The prevention of microbiological deterioration of Jute potato-bags during storage.**—*Netherlands J. agric. Sci.*, **8**, 1, pp. 15–33, 2 fig., 1 diag., 1960.

Rot-proofing treatments at the Central Lab. T.N.O., Delft [cf. **38**, 59], ensured better protection of bags buried in soil than bags containing potatoes stored at 5° C. for 4 months. Application of D.D.M. (2,2'-methylene bis (4-chlorophenol) compound)+Cu-fixation [cf. **38**, 146] was most effective but the most expensive, while Cu-8-oxyquinolinolate, tributyltin, D.D.M. alone, and cuprammonium (the cheapest of all) were creditable. On the other hand, Cu-naphthenate and lauryl-pentachlorophenol are not recommended, the latter affecting the taste of the stored potatoes. Freshly impregnated bags should not be used, since potatoes may be damaged by the volatile solvents of the fungicides.

Nilsson (L.). **Glasighet i Potatis, en torskada.** [Jelly end-rot in Potatoes, a drought injury.] -*Växtskyddsnotiser, Stockh.*, **23**, 4, pp. 47–51, 4 fig., 1 graph, 1959. [9 ref.]

Essential information on the disorder is summarized [cf. **37**, 441 *et passim*]. Its occurrence is reported on var. Bintje on sandy soils with gravel subsoil near

Landskrona, Sweden, in the 1957 crop, when the rainfall in June and July was significantly below normal and temp. frequently high. The av. incidence was estimated at 0·7%, but in some lots reached up to 10.

Loebenstein (G.) & Harpaz (I.). **Virus diseases of Sweet Potatoes in Israel.**—*Phytopathology*, **50**, 2, pp. 100–104, 8 fig., 1960.

Three virus diseases are described from the agric. Res. Sta. and Fac. Agric., Hebrew Univ., Rehovot, and considered to differ from those already known. They have so seriously depressed yields since 1954 that cultivation of the crop, started in Israel in 1949, has been discontinued.

Sweet potato vein clearing virus initially causes minute chlorotic specks between veins, mostly on veinlets; subsequent vein clearing is followed by a brilliant mosaic and plants become stunted and chlorotic. Above 28° C. symptoms are masked, but with fluctuating temps. and a min. below 8° purplish margins appear round the chlorotic areas. The virus was transmissible by graft and by *Bemisia tabaci*, but not mechanically, by soil, or by *Myzus persicae*; it was transmitted to *Ipomoea purpurea*, *I. mexicana*, and *I. bona-nox*, but not to 4 solanaceous plants, cucumber, groundnut, or cotton. Three strs. were distinguished; a chlorotic streak str., milder, and masked at 25°; a median chlorosis str. producing faint chlorosis along the mid-rib with protrusions along the main veins; and an angular spot str., characterized by irregular spots, often made up of 3–4 cleared veinlets.

Sweet potato ring spot virus [cf. **39**, 190] causes conspicuous ring spots 4–5 mm. diam. Infected plants are stunted and chlorotic. Symptoms are conspicuous on Gokoku; var. 21 is a symptomless carrier. The virus was readily transmissible by grafting and by *M. persicae*, but not by *B. tabaci*, mechanically, or by soil. Symptoms were masked at 26–28°; *I. tricolor* and *I. leari* were naturally infected, but the virus was not aphid-transmissible to tobacco or *Datura stramonium*. A complex infection by the vein clearing and ring spot viruses caused necrotic lesions on var. 35 (L-133) and severe chlorosis, rosetting, and purple coloration of the youngest leaves on Gokuku.

Field infection by the vein clearing virus is often accompanied, mainly in cooler weather, by leaf puckering, which was transmitted in 13 of 18 grafts, and would seem to be caused by a distinct virus. From plants with both symptoms *B. tabaci* transmitted only vein clearing. Despite systematic search over a period of 3 yr. no cases of internal cork virus [loc. cit.] were found [but cf. **38**, 31].

Loebenstein (G.). **Identifying two Sweet Potato viruses with paper chromatography.**—*Phytopathology*, **50**, 2, pp. 98–99, 2 fig., 1960.

At the agric. Res. Sta., Rehovot, Israel, sweet potato vein clearing and ring spot viruses [see above] were readily distinguished chromatographically in concentrated sap from the 10 youngest upper leaves, using 0·1 M sucrose as a solvent. Details of the procedure are given. The R_F values were 0·53 (the same for different strains) and 0·67, respectively. Diseased sap gave a distinct 'tailing' on the chromatogram, whereas with healthy sap there were no movements of proteins.

Martin (W. J.) & Kantack (E. J.). **Control of internal cork of Sweet Potato by isolation.**—*Phytopathology*, **50**, 2, pp. 150–152, 1960.

At La State Univ., Baton Rouge, it was shown that sweet potato vars. susceptible to sweet potato internal cork virus [**39**, 190] remained healthy when grown > 100 yds. from infected plants. Even at 120 ft. only 2·9% infection occurred in a trial in 1956.

Daines (R. H.), Brennan (Eileen), & Leone (Da A.). **Effect of plant bed temperature and sweet Potato dip treatments on incidence of Sweet Potato sprout**

decay caused by Diaporthe batatatis.—*Phytopathology*, **50**, 3, pp. 186–187, 1 graph, 1960.

Further studies at N.J. agric. Exp. Sta., New Brunswick [cf. **38**, 622] showed that infection by *D.* [*phaseolorum* var.] *batatatis* [cf. **11**, 535; **34**, 273] was greater at 85° than at 75° or 90° F., which correlates with growth of the fungus *in vitro*. Of the protective dips used mercurials were best, semesan bel (1 lb./7½ gal.) reducing dry rot at 85° from 81·3% in the untreated to 7%, and coromerc (1 pint/10 gal.) to 10·9%, while tersan OM, dyrene, and captan, in that order, were less effective.

Faan (H. C.), Chou (L. K.), & Leung (H. M.). **Field control of bacterial wilt of Sweet Potato.**—*Acta phytopath. sinica*, **5**, 2, pp. 79–88, 1959. [Chin. Abs. from Engl. summ.]

In joint studies by S. China agric. Coll., Kwangtung agric. Res. Inst., and the agric. Bureau Kao-chan District this disease [cf. **37**, 179] was found to be transmitted through cuttings, seed tubers, and soil, as shown by increased incidence in the absence of crop rotation. Effective control was obtained from using healthy tubers for seed and establishing sweet potato plantations in places previously flooded for ½ yr. or longer, where rice or water-taro had been grown. Of vars. common in Kwangtung, Tai-Nung no. 46 [loc. cit.] proved highly resistant and is therefore recommended for high land areas where flooding is not possible.

Diseases.—*Rep. Hawaiian Sug. Exp. Sta., 1959*, pp. 16–20, 7 fig., 1959.

In this report, covering the period 1 Oct. 1958–30 Sept. 1959, it is stated [cf. **38**, 335] that red rot *Physalospora* [*Glomerella*] *tucumanensis* still caused much damage to 38–2915 in some areas. Chlorotic streak [virus] was widespread in the heavy rainfall area. Leaf scald (*Xanthomonas albilineans*) caused minor losses in 44–3098 approaching maturity. Ratoon stunting [virus] was present in a localized area of 37–1933 on Kauai. In a var. resistance test the yield of diseased cane was significantly lower than that of healthy when both were harvested at 19 months, healthy cane (all vars.) averaging acre 140·4 tons cane and 15·1 'ton pol.' [a polarization value] as against 127·8 and 13·1, respectively, for affected canes. Reduced germination due to pineapple disease (*Ceratocystis paradoxa*) [**37**, 309] was reported chiefly from areas where the cuttings had not been treated with PMA [phenyl mercury acetate], which proved superior to 12 new fungicides tested (8 in the field).

The results of greenhouse pot tests indicated that B(ayer) 22555 (*p*-dimethylamino-benzenediazo sodium sulphonate) effectively controls *Pythium* root rot when added to the soil in 2 separate applications of 133 lb./acre at bi-weekly intervals. In other pot tests the root rot fungus *P. graminicola* significantly reduced the growth of seedlings and of 37–1933. No clear evidence was found of any complex between nematodes and *P. graminicola*. *Fusarium oxysporum* (originally isolated from sugarcane roots) alone significantly increased the top growth of seedlings, but did not increase root growth; combined with the root-knot nematode (*Meloidogyne incognita* var. *acrita*) both significantly reduced root growth but not top growth. In every instance better top and root development occurred in soils fumigated with methyl bromide than in the non-fumigated.

Barrie (A. G.). **Some factors affecting the germination of Cane after hot water treatment.**—*Proc. Qd Soc. Sug. Cane Tech., 1959*, pp. 93–103, 1 graph, 1959. [17 ref.]

Following a review of hot-water treatment against ratoon stunting virus [cf. **38**, 276], the author describes and discusses the results of trials on vars. Q. 57, Q. 50, Pindar, Trojan, and Badila, at the Northern Sugar Exp. Sta., Gordonvale, in 1957

and 1958. Germination after 3 hr. at 50° C. rose from 4 to 87% between June and Sept. Treated top setts of non-arrowed stalks reached outstanding germination figures in Sept. and Nov. Cane from outside rows was more resistant to damage by the treatment than that from inside. The use of whole stalks instead of setts [**39**, 344] gave variable results. Rapid cooling after removal from the hot water was not beneficial to Pindar and Q. 50 and actually damaged Trojan, while germination of the 2 former and Q. 67 was also impaired by keeping the setts damp for 1–3 days between treatment and planting. In Sept. treated cane was found to be no more susceptible to dry conditions than untreated in respect of germination. The auxin content of the stalks is postulated to be the factor most probably associated with differential resistance to damage by long hot-water treatment [**28**, 197], though temp. and maturity cannot be dismissed as altogether irrelevant.

TODD (E. H.). **Elsinoë disease of Sugarcane in Florida.**—*Plant Dis. Reptr*, **44**, 3, p. 153, 1 fig., 1960.

A report by U.S. Dept Agric. on *E.* sp. attacking vars. CI. 41–223 and F. 31–436 (in the latter only on lower leaves of mature stalks) at Canal Point, Fla. The 1st symptoms were tiny, purple lesions on the mid-rib tissues on the upper side of the leaves, later coalescing and bearing fructification $\frac{1}{4}$–$1\frac{1}{2}$ mm. long, with dark-brown margins, appearing as a white rash to the naked eye. The pathogen, which has also been found in Brazil, is to be described and named.

GOKHALE (N. G.). **Report on a tour of the U.S.S.R. and seven East European countries—summer 1958.**—*Mem. Toklai exp. Sta.* 25, 30 pp., 5 pl., 1958. [Received Jan. 1960.]

This report on the tea industry mostly concerns the U.S.S.R., where the crop is noted (p. 6) as being remarkably free from disease [cf. **38**, 542].

DAS (G. M.), SARMAH (K. G.), & AGNIHOTHRUDU (V.). **Phytosanitary measures in Tea during the dormant season.**—*Two & a Bud* (*News Lett. Toklai exp. Sta.*), **6**, 3, pp. 14–19, 1959.

This general account includes standard prophylactic measures against tea diseases [cf. **39**, 345].

MULDER (D.). **Report of the Plant Pathologist.**—*Rep. Tea Res. Inst. Ceylon, 1958*, pp. 62–66, 1959.

Some of the information in this report [cf. **38**, 162] has already been noticed [**39**, 346]. Severe defoliation of mature *Albizzia moluccana* trees was caused by *Pleiochaeta albizzia.* An inventory is given of 8 abnormal leaf patterns and forms that occur in tea, some possibly due to virus infection.

SVOBODOVÁ (Mme J.). **The behaviour of the S-strain of Tobacco mosaic virus as determined by biological tests.**—*Biol. Plant., Acad. Sci. Bohemosl.*, **1**, 2, pp. 126–134, 2 fig., 1959. [11 ref. Abs. in *Landw. Lit. Tschechosl., 1959*, 3, p. 59, 1959.]

The new str., S, displayed on all 10 hosts examined symptoms distinguishing it from str. A1 and the common green str. of TMV [**38**, 191]. The relation between the incubation period and the effect on growth of tobacco, the behaviour in *Nicotiana rustica*, and quantitative tests in *N. glutinosa* showed S to be the least pathogenic. While all biological tests indicated its likeness to the common str., serological and interference examinations related it to str. A1, from which it had sprung. All 3 strs. from pressed sap behaved alike and had the same host range; *Physalis alkekengi* and *P. franchetii* act differentially [to S] to some extent.

Bawden (F. C.) & Kleczkowski (A.). **Some effects of ultraviolet radiation on the infection of Nicotiana glutinosa leaves by Tobacco mosaic virus.**—*Virology*, **10**, 2, pp. 163–181, 1 graph, 1960.

Further work [cf. **39**, 42] at Rothamsted exp. Sta. has led the authors to conclude that ultra-violet irradiation has a stronger effect on the capacity of detached *N. glutinosa* leaves to support the multiplication of tobacco mosaic virus than had previously been thought. Conclusions from experiments in which leaves are irradiated at different intervals [cf. **35**, 579; **37**, 183] after inoculation are thus of doubtful validity. The 'photoreactivation' effect of irradiation [cf. **35**, 272] is highly variable, so that, depending on the physiological state of the leaves and the dose of radiation energy, the treatment may enhance the original capacity to support virus multiplication, or restore it partially or completely. Rubbing leaves twice may prevent daylight from repairing radiation damage to the leaf's capacity. Response to photoreactivation also depends on the type of inoculum: when leaves were inoculated with intact virus immediately after irradiation, daylight increased the number of lesions to the same extent as when irradiated leaves were kept in daylight for some hours before inoculation. By contrast, leaves inoculated with infectious nucleic acid immediately after irradiation produced no more lesions when kept in the light than when kept in the dark: irradiated leaves kept in the light for some hours before inoculation, however, produced more lesions than comparable leaves kept in darkness. Photoreactivation of the leaf's capacity to support infection takes some time, and it seems that intact virus particles can survive this time unharmed *in vivo* whereas the unstable nucleic acid is inactivated.

Shepherd (R. J.) & Pound (G. S.). **Magnesium nutrition of Nicotiana tabacum in relation to multiplication of Tobacco mosaic virus.** *Phytopathology*, **50**, 3, pp. 195–198, 1 fig., 1960.

In further studies at Univ. Wis. [cf. **39**, 440] Havana 38 tobacco infected with tobacco mosaic virus and grown in liquid culture with 0–486 p.p.m. Mg developed typical deficiency symptoms at 0 and 0·5 p.p.m. Assays showed a consistent, though small, reduction in virus conc. in Mg-deficient plants.

Bobȳr (A. D.). Вплив деяких метаболітів на некротичну реакцію, викликану вірусом тютюнової мозаїкі. [The effect of some metabolites on the necrotic reaction caused by Tobacco mosaic virus.] *J. Microbiol., Kiev*, **20**, 4, pp. 23–27, 1958. [Russ. summ. Abs. in *Referat. Zh. Biol., 1959*, 22, p. 59, 1959.]

Of 26 chemical compounds applied at the time of leaf inoculation and after 24 hr., aspartic and glutamic acids, leucine, lysine, free cysteine, and cystine gave 58–67% inhibition of necrosis development [**39**, 41, 347, and below] in leaves of *Nicotiana glutinosa*. Glygocol, tryptophane, and β-phenylalanine gave 24–42% inhibition. Alanine, arginine, asparagine, and histidine considerably stimulated the necrotic reaction. Valine, serine, tyrosine, and anthranilic acid had no effect. Vitamins B and D, respectively, gave 55 and 57% stimulation and nicotinic acid 50%. Adrenalin, thyroidin, and folliculin caused 40–53% inhibition.

Bobȳr (A. D.). Антивірусні властивості продуктів життедіяльності грибів роду **Mortierella.** [Antivirus properties of the products of the vital activity of fungi of the genus *Mortierella*.]—*J. Microbiol., Kiev*, **21**, 5, pp. 36–39, 1959. [Russ. summ.]

At Inst. Microbiol., Kiev, *Mortierella* spp. [cf. **38**, 200] in certain circumstances produced substances which strongly inhibited tobacco mosaic virus *in vitro* and to a lesser extent in isolated leaves of *Nicotiana glutinosa* [see above]. *M. alpina* 4-II and 22-II, *M. candelabrum* 13 5, and *M. vesiculosa* 10668a were the most active. *M. alpina* str. 9939 on wheat medium and str. 10633 on maize medium

produced substances which stimulated the virus. On wheat medium *M. alpina* had a higher antivirus activity than on maize or wort. The nutrient medium also affected the activity of cultures of other *M.* spp.

Gol'din (M. I.) & Lapidus (N. G.). Действие гиббереллина на вирус мозаики Табака. [The effect of gibberellin on Tobacco mosaic virus.]—*Bull. Acad. Sci. U.R.S.S.*, **25**, 1, pp. 129–131, 1 fig., 1960.

Tests at the Inst. Microbiol., Moscow, indicated that gibberellin [cf. **39**, 10] does not affect tobacco mosaic virus or its reproduction *in vitro* or *in vivo*.

López Matos (L.). **Evidence of the presence of the Tobacco etch virus in Puerto Rico.**—*J. Agric. Univ. P.R.*, **43**, 3, pp. 171–181, 2 pl. (9 fig.), 1 fig., 1959. [Sp. summ.]

Use of Valleau's method [**20**, 85] and serology at Agric. Exp. Sta., Gurabo, indicated that a new virus disease, found in tobacco (cigar-filler and chewing) plants in Puerto Rico in 1954, is related to the etch virus [**35**, 552]. The infected plants developed chlorotic spots on the younger leaves followed by necrotic spots, arcs, and sometimes rings as the leaves became older. The younger leaves also appeared slightly chlorotic. Chewing tobacco is more severely affected than cigar-filler. The virus was easily transmitted mechanically and by *Myzus persicae*. The variety of symptoms observed suggests that besides severe etch [loc. cit.] the mild- and coarse-etch strs. may also be present.

Mandryk (M.). **Host-pathogen relationship in Tobacco plants with stems infected by Peronospora tabacina Adam.**—*Aust. J. agric. Res.*, **11**, 1, pp. 16–26, 2 pl. (4 fig.), 1 fig., 1960.

At Div. Plant Industry, Canberra, stem infection of Virginia Gold tobacco seedlings and plants 3–3½-months-old by *P. tabacina* [cf. **38**, 626] was obtained by spraying with a spore suspension, by natural infection, by placing conidia on the epidermis of the stem or stem segments, or by injecting a spore suspension into stem tissues. The mycelium grew from the parenchyma of the leaf blade into the vascular system of the midrib and petiole and thence into the stem. In small seedlings mycelium was usually associated with all tissues and frequently killed the plant. In flowering plants necrosis was confined mainly to the periphery of the secondary xylem, the cambium, and the inner part of the external phloem. As the xylem aged it barred inward spread. The cortex was not readily penetrated. Early establishment in the stem cambium often inhibited xylem development and plants so affected snapped off readily at the base.

Growth of *P. tabacina* in the stem was favoured by high humidity, but arrested by exposure to benzene vapour (from 20–30 ml.) or to a daily range of 75–105° F. at R.H. $\leqslant$ 70%. High temps. during the day followed by low at night did not prevent the spread of the fungus from the leaves into the stem. It spread from infected stems into new axillary shoots, sporulation occurring subsequently on the leaves. The survival of *P. tabacina* as mycelium in infected stems for long periods, with its ability to pass into new growth and later sporulate, provides a source of inoculum for primary spring infection and forms an important link in the perpetuation of the fungus.

Gaines (J. G.). **History of black shank in Georgia flue-cured Tobacco including spread of the disease in 1959.**—*Plant Dis. Reptr*, **44**, 3, pp. 155–158, 1960.

Whereas tobacco black shank (*Phytophthora parasitica* var. *nicotianae*) [cf. **39**, 45] occurred only exceptionally and temporarily in the flue-cured areas before 1955, surveys by Ga Coastal Plain Exp. Sta., Tifton, now show that it has since spread over 26 counties of S. Ga., reaching max. incidence in 1959. In plot tests where

infection by drainage water and through other channels was prevented, wind-borne spread of up to 800 ft. was apparent.

Marcelli (E.). **Un marciume del piede del Tabacco in semenzaio e in campo causato da Phytophthora sp.** [A foot rot of Tobacco in the seed-bed and in the field caused by *Phytophthora* sp.]—*Tabacco*, **63**, 692, pp. 235-257, 2 pl. (20 fig.), 1 fig., 1959. [Engl. summ. 55 ref.]

Studies are described from the Lab. Pat. veg. dell'I.S.S.T., Scafati, Italy, of a collar rot similar to black shank, which appeared in tobacco seed-beds near Pontecagnano in 1957 and rapidly reduced the roots to a few threads, while the leaves of clumps of plants here and there yellowed and wilted; the collar rot also occurred on a few plants in the field. From affected material a fungus was isolated and identified by Leonian's key [**14**, 398] as *P. palmivora* (in which *P. parasitica* is included). In culture sporangia were 24–63 × 19–47 μ and chlamydospores 22–51 μ; sex organs were not observed. The fungus grew well at 31° and 35° C., but not at all at 8° or 37°, nor in malachite green at 1 in 2,000,000, though growth began at 1 in 3,000,000. It was only weakly pathogenic and cannot, therefore, be identified with *P. parasitica* var. *nicotianae* as found in the United States.

Cammilli (A.). **Prove di confronto tra i vari sistemi di sterilizzazione del terriccio dei semenzai.** [Comparative tests of various methods of sterilizing seed-bed soils.]—*Tabacco*, **63**, 692, pp. 270–284, 14 fig., 1959. [Engl. summ.]

At the Ist. sci. sper. Tabacchi, Scafati, Italy, in 1958 soil treatments with semex (phenyl mercury acetate) 100 and 150 g. cu.m. of soil (1:15 and 2:15), vapam, 1 and 2% commercial formalin, oven-heating at 90–100° C., 'frux-terra universale' (a layer of 8–10 cm., well watered) all controlled root rot caused by *Thielaviopsis basicola* [**37**, 202], inoculated into the soil, 'frux terra universale', oven-sterilization, and vapam giving the best results, and vapam being the most economical also.

Ternovskiĭ (M. F.). Выведение болезнеустойчивых сортов Табака. [The development of disease resistant Tobacco varieties.]—Ex Достижения по растениеводству [Achievements in plant growing], pp. 190–194, State publishers for agric. Literature, Moscow, 1958. Roubles 18.30.

The general principles of plant breeding as applied to the development of resistant tobacco vars. [**37**, 596] at the All-Union sci. Res. Inst. for Tobacco and Makhorka are reviewed. For vars. resistant to *Thielaviopsis basicola* [cf. **31**, 187] Trapezoid L served as the initial material. Several with immunity from tobacco mosaic virus [**39**, 243] and resistance to *T. basicola* were produced. Trapezoid 295 was the most interesting being intermediate between the Kuban and the Beregovoĭ Trapezoids.

Linn (M. B.) & Luckmann (W. H.). **Tomato diseases and insect pests: identification and control.**—*Circ. Ill. Coll. Agric.* 809, 59 pp., 34 fig., 1959.

A revision of Circular 683 [**31**, 462].

Weber (P. V. V.). **The effect of Tobacco mosaic virus on Tomato yield.**—*Phytopathology*, **50**, 3, pp. 235–237, 1960.

At the Dept agric. Res., Campbell Soup Co., Riverton, N.J., Improved Garden State tomato, susceptible to tobacco mosaic virus (TMV), 2 lines of W-R Brookston (A, max. mosaic resistance and B, min.), and a mosaic tolerant selection, MStW210-5 2-2, field-planted on 29 May, were inoculated with Johnson's No. 1 str. Inoculation on 7 June significantly reduced yield of the 1st picking of Improved Garden State, 11½ weeks later, while inoculation on 2 July reduced that of the 2nd picking, 9½ weeks thereafter. Early yield reductions also occurred in W-R Brookston A, late-inoculated plants being affected at the 1st picking, a reduction 8 weeks after inoculation. The effect of early inoculation appeared to be greatest in the early

and mid-harvest pickings. Contrary to the general belief that the earlier the infection the greater the loss, the total yield of W-R Brookston A was greater after early inoculation than after late. MStW210–5 was relatively unaffected by inoculation. It is possible that for some vars. a suitably timed, early inoculation with a mild str. of TMV might reduce loss of total yield caused by later infection [cf. **30**, 249; **32**, 403; **37**, 738].

SCHEFFER (R. P.). **Variations in respiratory responses in Fusarium-infected Tomato plants.**—*Phytopathology*, **50**, 3, pp. 192–195, 1960.

Further studies at Mich. State Univ., E. Lansing [cf. **37**, 739], showed that the leaves of pot-grown tomato plants inoculated with *F. oxysporum* f. [*F. bulbigenum* var.] *lycopersici* and given low N ($\frac{1}{10}$ the usual level) in an otherwise standard (1H) Hoagland solution [cf. **29**, 181] took up much more O than the uninoculated; with high ($\times 3$) N, infection had no such effect. The degree of stimulation of O uptake by infection varied with the season, being max. with high light intensity and long days. Stem tissues behaved similarly. The results suggest that increased respiration is not necessarily a concomitant of disease development, but is dependent on environment and may therefore be only a secondary factor in pathogenesis.

SEWELL (G. W. F.). **Direct observation of Verticillium albo-atrum in soil.**—*Trans. Brit. mycol. Soc.*, **42**, 3, pp. 312–321, 3 pl. (8 fig.), 1959.

At E. Malling Res. Sta., Kent, tomato seedlings at the 1–2 leaf stage were transplanted to glass-walled observation boxes, $2 \times 3 \times 1$ in. After 14–21 days the soil was inoculated with *V. alboatrum* [**39**, 49] by inserting fragments of infected hop bine or by adding a conidial suspension; the latter method, however, induced no sign of soil invasion or root infection. The boxes were examined weekly using a wide-field binocular dissecting microscope. The fungus did not penetrate the soil beyond 2 mm. from the inoculum, and was generally confined to the tissues which it initially invaded as a parasite. Sporulation occurred on inoculum fragments 14–21 days after deposition in the soil and on infected roots following their death: no widespread root-surface colonization occurred before infection. The length and vigour of sporulation was determined by the nutritional status of the base. Abundant production of conidia over extended periods in soil suggests their importance in the epidemiology of the disease: contact between host plant roots and diseased residues is not considered a prerequisite of infection, at least in the initial sporulation phase.

GROGAN (R. G.) & TAYLOR (R. H.). **Verticillium wilt of Tomatoes. Its importance in Victoria.**—*J. Agric. Vict.*, **58**, 1, pp. 6–8, 2 fig., 1960.

The yellowing and necrosis of the lower leaves caused by *V. alboatrum* [**36**, 454], observed on outdoor tomatoes for many years, is widespread in both northern and southern Victoria. The pathogen was also isolated from a common weed in crops, *Solanum nigrum*, which also exhibited severe wilt and necrosis of lower leaves. Roots of Potentate and Salad Special tomatoes were clipped while submerged under a suspension of *V. alboatrum* spores from isolates from the Doncaster and Bendigo areas: in 2 weeks the cotyledons yellowed and later abcissed. Tolerant vars. from U.S.A. [**38**, 545] inoculated as above with the Doncaster isolate grew to 6–8 in., while inoculated Potentate plants were less than 2 in. tall. The only symptom evident on the 3 tolerant vars. was a yellowing restricted to the cotyledons.

ILLMAN (W. I.), LUDWIG (R. A.), & FARMER (JOYCE). **Anthracnose of canning Tomatoes in Ontario.**—*Canad. J. Bot.*, **37**, 6, pp. 1237–1246, 5 pl. (31 fig.), 1959.

It was demonstrated at the Pesticide Res. Inst., London, Ont., that *Colletotrichum*

atramentarium [**37**, 25, 511] was the predominant cause of ripe fruit rot of canning tomatoes in Ontario and the adjoining regions of the United States. A description is given of infection which was readily obtained on all parts of the plant, but a short period of rapid growth in the host was invariably followed by a latent period until the surrounding host tissues became senescent. A period of low temp. storage partially overcame this latency in the fruit, causing symptoms to appear in green fruit. In addition to foliage spraying [cf. **28**, 313], soil treatments, preplanting dips, and cultural practices are possible methods of control; breeding for fruit resistance is suggested.

SCHMIDT (TRUDE). **Selten, aber doch anzutreffen—die Tomatenstengelfäule.** [Rare, but nevertheless present—Tomato stem rot.] –*Pflanzenarzt*, **12**, 12, p. 130, 2 fig., 1959.

This note from the Bundesanstalt für Pflanzenschutz, Vienna, records that mild stem rot (*Didymella lycopersici*) [cf. **28**, 377; **38**, 280] in a nursery in Burgenland in 1958 was followed by an outbreak, with 70% of plants affected, in 1959.

CASARINI (B.), DE RINALDINI (V.), & AVANZI (U.). **Prove di lotta contro Xanthomonas vesicatoria.** [Control experiments against *X. vesicatoria*.]—*Indust. ital. Cons. aliment.*, **34**, 3, pp. 206–208, 1 fig., 1959.

Of 3 compounds tested against *X. vesicatoria*, incidence of which on tomato is reported to be steadily increasing in Italy [**39**, 351], 0·5% Caffaro powder was more effective than agrimycin (100 p.p.m.) or 0·25% aspor in recent trials at Noceto di Parma, where 5 treatments were applied between 22 July and 18 Sept. 1958.

YOUNG (P. A.). **Dwarfing of summer Tomatoes by crease stem.**—*Plant Dis. Reptr*, **44**, 3, pp. 170–171, 2 fig., 1960.

This disease [**36**, 283], studied at Texas agric. Exp. Sta., Jacksonville, is characterized by rigidly upright stems with flattened areas and deep longitudinal creases or holes, short internodes, browning of affected tissues, dwarfing, and compact bunchy appearance of the plants. Tomato vars. and selections ranged from immune to very susceptible. N excess is associated with the disease, which is apparently physiological and can be avoided by providing adequate water drainage and using resistant vars. (e.g. Stockdale).

PŘÍHODA (A.). **Lesnická fytopatologie.** [Forest phytopathology.]—366 pp., 194 fig., Prague, State Agricultural Publishers, 1959. [Abs. in *Landw. Lit. Tschechosl., 1959*, 3, p. 70, 1959.]

Intended as a textbook for the students of Czechoslovak colleges of forestry, this volume elucidates basic phytopathological concepts, explains conditions for and modes of infection, and discusses control of diseases, with notes on fungicides and apparatus. The largest section deals with physiological, virus, bacterial, and particularly fungus diseases. An identification key, indexes, and a list of references are appended.

JANČAŘÍK (V.) & UROŠEVIČ (B.). **Fungicidy v lesnictví.** [Fungicides in forestry.] —*Zpr. V.Ú.L.H.M.*, **5**, 2, pp. 1–7, 6 fig., 1959. [31 ref.]

In this comprehensive survey, general but with particular reference to Czechoslovakia, fungicides are treated under the following headings: (1) inorganic, including S compounds effectively used, for instance, in control of the epidemics of *Microsphaera alphitoides* on oak [cf. **36**, 672]; Hg compounds, of which agronal is the only one on the market in Czechoslovakia; Cu compounds, particularly Bordeaux mixture, which gives good results against the widespread *Lophodermium pinastri* on pine [**34**, 827] and other conifer infections; (2) standard organic chemicals, such as formalin and salicylic acid, employed for soil disinfection in the nurseries; (3) new

organics, including novozir, thiram, and Cu oxyquinolinate, used as yet chiefly for trials; (4) antibiotics (Czechoslovakia produces phytostrept, a by-product of streptomycin, and actidione 57), phytostrept at 0·01, 0·02, and 0·1% proved an effective disinfectant for spruce seed; and (5) systemic fungicides, such as chloramin T and picric acid.

Ozolin (G. P.). Проблема селекции древесных пород на иммунитет к болезням и вредителям. [The problem of tree selection for immunity from diseases and pests.]—Лес. Хоз. [*Les. Khoz.*], **12**, 2, pp. 28–31, 1960.

This review reports that in 1937–8 A. S. Yablokov noted clones of aspen in the forests of the Shirinskiĭ Forest Establishment, Gor'kovskaya region, with high resistance to *Fomes igniarius* [**37**, 559]. The triploid Ispolinskaya aspen is almost completely resistant, and a male clone was developed. At the Oboyanskiĭ Forest Establishment in 1952 S. P. Ivannikov observed a 2nd focus of the Ispolinskaya polyploid form, from which a female clone was developed. In 1958 there was only 2·5% infection in plantations of Ispolinskaya compared with 100% for ordinary aspen. Many hybrid saplings with Ispolinskaya as male or female parent are resistant. Black poplar [*Populus nigra*] and balsam poplar [*P. balsamifera*] are completely resistant to *Melampsora allii* [**38**, 427]. *Fusicladium radiosum* [*Venturia populina*] was not found on white poplar [*P. alba*]. Following inoculations with *Cytospora chrysosperma* [*Valsa sordida*: **38**, 427; **39**, 128] at the Uzbek Forestry Inst. in 1952, the most resistant vars. were Bolleana and the Pervenets, Uzbekistana, and Stremitel'nyĭ hybrids (local *P. alba* × Ispolinskaya).

In work by É. A. Oganova, large-fruited oak and swamp oak [*Quercus lyrata*] were resistant to mildew [*Microsphaera* spp.: **39**, 55]. Also resistant under cultivation in the European parts of the U.S.S.R. were red oak [*Q. borealis*], oriental oak, and Mongolian oak [*Q. mongolica*], though the last is everywhere infected in its homeland. Downy ash [*Fraxinus pubescens*] and green ash [*F. viridis*] are resistant to endoxyline scab [*Endoxylina stellulata*: cf. **38**, 426]. Some pines are resistant to cast [*Lophodermium pinastri*: **38**, 579]. In 1958 V. N. Shafranskaya reported that Japanese larch [*Larix leptolepis*] is resistant to *Meria laricis* [cf. **35**, 336] and in 1956 M. A. Chumaevskaya noted that the silver [*P. argentea*], black, pyramidal [*P. nigra italica*], and Narynskiĭ poplars were resistant to *Pseudomonas rimaefaciens* [*P. syringae* f.sp. *populea*: **35**, 646].

Mocanu (Victoria V.). **Experimentări de infecții artificiale cu ciuperci xilofage la specii de Populus, Quercus și Picea.** [Inoculation experiments with wood-destroying fungi on species of *Populus*, *Quercus*, and *Picea*.]—*Rev. Padurilor*, **73**, 5, pp. 287–291, 1958.

The inoculations were carried out with agar cultures in plantations and forests at 4 sites in Romania by the Institutului de Cercetări Silvice. On pyramidal [Lombardy] poplar *Fomes marginatus* [cf. **36**, 223] and *Trametes gallica* f. *trogii* [*T. trogii*: cf. **34**, 549] proved active parasites. Hybrid black poplars inoculated at different times between Apr. and Nov. reacted differently according to the prevailing humidity. On oaks *F. cytisinus* [*F. fraxineus*] and *T. lactea* [*Polyporus lacteus*], isolated from oak, caused no symptoms in the branches or crown and the infection round the inoculation site had increased only slightly after 6 months. *F. marginatus* isolated from spruce proved an active parasite in spruce, though after 3 yr. there were no apparent symptoms externally. The methods of conducting inoculations are discussed.

Ingestad (T.). **Studies on manganese deficiency in a forest stand.**—*Medd. SkogsforsknInst., Stockh.*, **48**, 4, 20 pp., 3 fig., 1 graph, 1959. [Swed. summ.]

The deficiency was responsible for chlorosis of spruce and birch trees noticed in

1953 on a drained fen rich in lime on the island of Gotland; it was largely counteracted by foliage spraying and stem injections with $MnCl_2.4H_2O$. The symptoms disappeared when the Mn content of the spruce needles reached approx. 0·002 and of the birch leaves 0·0017% of the dry wt. To achieve these levels a conc. of 2% in the range 0·5–5% for spruce and 2–10% for birch proved sufficient. The injection of 50% $MnCl_2.4H_2O$ into spruce restored the green coloration only on branches above the site of treatment, the effects of which, though gradually lessening, remained apparent during the following 2 yr. Soil amendments at the rate of 100 kg./ha. (28 kg. Mn) failed to ameliorate the deficiency symptoms in spruce for 3 yr. after treatment, but subsequently a more greenish tinge developed. Spruce responded by increased growth to all forms of Mn treatment.

Pine trees in the same stand sustained relatively little damage from Mn deficiency, though the young needles occasionally turned pale green or yellow in late autumn. They reacted favourably to stem injections with $MnCl_2.4H_2O$.

Bain (D. C.). **Cercospora leaf spot of Tung in Mississippi.**—*Plant Dis. Reptr*, **44**, 3, pp. 190–191, 2 fig., 1960.

A note from Miss. State Univ. on the serious spread of *Mycosphaerella aleuritidis* [cf. **21**, 55] on the tung oil tree (*Aleurites fordii*) in S. Miss. The symptoms and causal organism are described. In addition to the leaf spots, which often appear on seedlings before they do on trees, dark-brown to black, ovate-elliptic, slightly sunken lesions occur on petioles and stems. Selection of resistant vars. is recommended in preference to spraying, which is not economic.

Ridé (M.) & Gudin (G.). **Aspects de la biologie du Phoma endogena (Spec.) et de quelques autres champignons parasites de la Châtaigne.** [Aspects of the biology of *P. endogena* and of some other fungi parasitic on Chestnuts.]—FAO/CH/24–Ac, 10 pp., 1958. [Mimeographed.]

This paper, presented to the 4th session of the International Chestnut Commission, held in Jugoslavia and Greece in Sept.–Oct. 1958, reports the considerable amount of fungal damage to chestnuts in France, both on the tree and in storage. Observations since 1955 on 6 different vars. showed 2 post-harvest rots to be particularly prevalent, caused by *Phoma endogena* [**38**, 166] and *Sclerotinia pseudotuberosa* [loc. cit.], microconidia of the latter reducing the nuts to a chalky, later black mass. The fungi penetrate mostly through the stylar orifice. *P. endogena* is more common in warm areas, while *S. pseudotuberosa* flourishes in cooler, damper regions.

Attack by *Botrytis* sp. [cf. **18**, 572] is very important in some years, occasionally very early in the season; it causes a soft, greyish rot. *Penicillium crustaceum* [**38**, 166] is frequent in insufficiently dried nuts. In 1955 and 1956 a *Cytospora* was common on nuts of the Marron du Luc var. stored in cellars, causing a greyish rot.

The results of field and laboratory studies of the biology of *Phoma endogena* are briefly described. It is concluded that the fungus becomes established in autumn in wounds caused by shedding of the fruits and leaves or by human agency. It overwinters on the tree and fructifies early in spring. Spore emission from the pycnidia is favoured by rain from May onwards, the leaves and then the cupules become infected, and secondary infections may continue until autumn. The trees are susceptible during the period of fruit formation. The fungus is able to fructify on and in the cupule. The stylar orifice and the lesions caused by insect attack provide further means of entry.

Treatment, when necessary, should be aimed at reducing the amount of infection present during harvesting and at prevention by spray applications combined with insecticides. Heat tests (including infra-red) on the nuts gave no success.

SCHAD (C.), GRENTE (J.), & SOLIGNAT (G.). **La protection de la châtaigneraie contre les maladies en France.** [The protection of Chestnut plantings against diseases in France.]—FAO/CH/25–Ab, 21 pp., 1958. [Mimeographed.]

In another contribution to the same meeting [see above] an account is given of the development of vars. resistant to ink disease (*Phytophthora cambivora* and *P. cinnamomi*) [**32**, 106]; its virulence has not declined and it still causes important losses. From 70 to 80% of the progeny of open pollinated *Castanea crenata* are resistant to inoculation, 50–60% of *C. crenata* × chestnut, less than 5% of cultivated chestnut, and about 50% of wild chestnut. Resistant progeny from controlled pollinations reach 72–95% in M. and P. hybrids, the best being M. 15 × M. 82, progeny of M. 75 (*mollisima*, male parent), Aw-2 (*crenata*) × P. 14, and Aw-5 (*crenata*) × M. 2, the last 2 being 100% resistant. A survey of the present distribution of canker (*Endothia parasitica*) in France [**37**, 317] showed that increase is rapid near badly infected areas, some of which have over 90% trees attacked. A paint containing Cu oxide and Hg oxide applied in 1957–8 halted the spread of cankers while a pentachlorophenol product protected against new infections. An extensive programme of testing for resistance is in progress and has produced 10 resistant hybrid clones; none of the crossings has produced more than 50% resistant progeny. Plantations are being rejuvenated with resistant vars.

Observations showed that attacks of *Diplodina* [*Diaporthe*] *castaneae* [cf. **36**, 673] in nurseries develop in damp conditions where aeration is insufficient; control depends on improved cultural conditions.

KRSTIĆ (M.) & HOČEVAR (S.). **Naša proučevanja v zvezi z zatiranjem endotioze.** [Our studies on the control of endothiosis.]—*Gozd. Vest.*, **16**, 8–9, pp. 225–243, 1958. [Germ., Fr. summ. Abs. in *Referat. Zh. Biol.*, *1959*, 20, p. 196, 1959.]

In the control programme against *Endothia parasitica* [**38**, 103] on *Castanea dentata* and *C. sativa* in Slovenia, Yugoslavia, the diseased trees were felled and burnt, the ground dug over, and the stumps treated with tormon 80 or tormon 100 (Sela, German Federal Republic), Na_2SiF_6 (Organic Dyestuff Manufacturers, Yugoslavia), or creosan-DNOC ('Zor'ka', Yugoslavia). Most effective were spraying the 1-yr. shoots from stumps with a 0·5% aqueous emulsion of tormon 80 and smearing the stumps with a mixture of 25 c.c. tormon 100 in 1 l. diesel oil or of Na_2SiF_6 in creosan (700 g./stump).

CAMPANA (R.). **Elms susceptible to Dutch Elm disease and Elm phloem necrosis.**—*Trees Mag.*, *Ohio*, **19**, 1, pp. 6, 19, 1958. [*For. Abstr.*, **20**, 3, p. 413, 1959.]

Notes on natural infection by Dutch elm disease [*Ceratocystis ulmi*: cf. **29**, 195] and phloem necrosis [virus: cf. **35**, 403] in supposedly resistant spp. and vars., including *Ulmus carpinifolia*, *U. pumila*, and the 'Augustine ascending elm', a cultivar of *U. americana*.

BART (G. J.). **Susceptibility of various Apple varieties to the Oak wilt fungus.**—*Phytopathology*, **50**, 2, pp. 177–178, 1960.

At Ohio agric. Exp. Sta., Wooster, 8 of 10 vars. of apple proved susceptible to trunk inoculation with *Ceratocystis fagacearum* [**36**, 737], while Cortland and Grimes Golden were highly resistant. From inoculations 1 ft. above the ground wilting progressed acropetally rather than basipetally from terminal parts as is usual in red oak.

TORRES (J. J.). **Enfermedad de las 'escobas de bruja' en las Encinas.** [Witches' broom's disease of Oak.]—*Bol. Serv. Plagas for.*, *Madrid*, **1**, 2, pp. 119–122 1958. [*For. Abstr.*, **20**, 3, p. 415, 1959.]

Describes the witches' brooms induced on *Quercus ilex* and *Q. coccifera* by *Taphrina kruchii* [**21**, 271] and their control.

Report. International Poplar Commission. Working party on diseases. 2nd Session (Rome, 24 and 25 September 1959). -FAO/CIP/MAL/11, 4 pp., 1959.

Taris (B.). **Contribution à l'étude des maladies cryptogamiques des rameaux et des jeunes plants de Peupliers.** [A contribution to the study of the fungal diseases of the branches and of young Poplars.] -FAO/CIP/MAL/10, 13 pp., 1959.

In the section of the report dealing with diseases [cf. **32**, 595; **36**, 143; **38**, 39] it is noted that *Dothichiza populea* is found all over Serbia [**37**, 604]. The cultivar *marilandica* is somewhat resistant [**39**, 57], but the planting of balsam poplar and [*Populus*] *nigra italica* is discouraged. Other diseases studied in Yugoslavia are those due to *Cytospora chrysosperma* [*Valsa sordida*: loc. cit.] and *Melampsora* spp. [cf. **38**, 341]. A disease in Syria appears to be caused by *V. sordida* [**38**, 383]. In Austria it was found that the resistance to *D. populea* of certain clones is different from their resistance to *Septoria populiperda* [? *S. populi* or *Septotinia populiperda*].

B. Taris describes his field and laboratory studies since 1954 upon *D. populea* [cf. **38**, 720], *V. sordida* [cf. **36**, 434], and *Fusarium avenaceum*. The last-named has been responsible since 1952 for important damage on young poplars in nurseries and in plantations in the regions of the Oise and Aisne and near Lyons, though death does not necessarily ensue.

Bachthaler (G.) & Dahte (A.). **Ergebnis eines Mittelprüfungsversuches zur Bekämpfung von Dothichiza populea, dem Erreger des Pappelrindentodes.** [Result of a fungicide trial for the control of *D. populea*, agent of Poplar bark canker.]—*Pflanzenschutz*, **11**, 10, pp. 135–138, 6 fig., 1 graph, 1959.

At the Arco-Zinneberg'sche Pappelbaumschulen, Moos/Ndb, Germany, brestan (0·3%), cupravit blue (0·75%), kupferoxydul-ultra (0·3%), and Bayer Hg (0·1%) were compared against *D. populea* [**39**, 56, 354] on 1–2 yr. old plants of the highly susceptible *Populus robusta*.

Aug. was the best month for spraying and brestan the most effective of the fungicides, 4 applications giving 95·6% healthy plants, compared with 8% in untreated plots. Hg was altogether ineffective.

Anderson (R. L.), Joranson (P. N.), & Einspahr (D. W.). **Hypoxylon canker on European Aspen.** *Plant Dis. Reptr*, **44**, 2, p. 132, 1960.

Cankers on *Populus tremula* in Wis. are reported from the U.S. Dept Agric., St. Paul, Minn., and Inst. of Paper Chemistry, Appleton, Wis., to be due to *Hypoxylon pruinatum* [**39**, 129], a new host record for N. America.

Sato (K.) & Shôji (T.). **Primary infection of anthracnose on Black Locust seedlings caused by the seed transmission of Guignardia robiniae K. Ito et T. Kobayashi and the control by seed treatments.**—*Bull. For. Exp. Sta. Meguro* 119, pp. 1–15, 4 pl., 2 fig., 1 graph, 1960. [Jap. Abs. from Engl. summ.]

At Tôhoku Branch Sta., Govt For. Exp. Sta., mycelium of *G. robiniae* was found in the spongy tissues and parenchyma of the seeds of *Robinia pseudacacia* [**38**, 549] but not in the cotyledons. The seedlings became infected through dormant mycelium in the seed also when conidia were applied to the seeds and soil. Infection developed best at low temp. and in wet soil. Treatment of seeds in boiling water or soaking for 5 min. in water at 70° C. hastened germination but did not disinfect the seed. Ceresan and uspulun were very efficient disinfectants (especially ceresan, which was more persistent). Combined hot water and ceresan increased germination except when ceresan was applied to wet seeds and injured them. Soaking for 12 hr. in 0·13% uspulun combined with hot-water treatment was the most beneficial: riogen and ruberon were also effective.

UOZUMI (T.). **Concerning the fungus Adelopus on Abies spp.**—*J. Jap. For. Soc.*, **41**, 6, pp. 243–245, 3 fig., 1959. [Jap.]

Phaeocryptopus ? *nudus* the causal agent of needle cast, is reported from the Govt For. Exp. Sta., Meguro, Tokyo, as having been first observed in Japan in 1956 on Douglas fir (*Pseudotsuga taxifolia*) [*P. menziesii*]. It has also been found on *Abies sachalinensis*, *A. veitchii*, *A. homolepis*, and *Tsuga diversifolia*. Symptoms begin to appear about June–July on the needles which are cast in Oct.–Nov., damage being considerable near the trunk and in the lower part of the crown. Mature spores were released from *A. veitchii* and *T. diversifolia* in Aug. and penetrated the needles, where they overwintered. Ascocarps on *A. sachalinensis* and *A. veitchii* are spherical to oval, indented in the middle, glossy, and rather hard, containing 8–13 clavate asci, swelling in the middle, each with 8 hyaline, bicellular spindle-shaped ascospores constricted at the septum. The stromata developed on both live and dead needles, the hypostroma penetrating the stomata with a long central foot. Morphological characters and measurements indicate that the same fungus is present on both hosts. A comparison with *Phaeocryptopus gaeumannii* and *P. nudus* [**17**, 638] showed the Japanese sp. to be close to, and probably identical with, the latter [cf. **32**, 518].

NUKUMIZU (T.), ANDÔ (M.), & DÔZONO (Y.). **On the relation of the rooting cutting percentage of Japanese Cedar to degrees of infection by Botryosphaeria sp.**—*Bull. For. Exp. Sta. Meguro* 119, pp. 27–32, 5 fig., 1960. [Jap. Abs. from Engl. summ.]

Shoot blight disease of Japanese cedar [*Cryptomeria japonica*] in the Obi district, Japan, attacked trees 10–15 or more years' old, causing serious damage to the Aka var. (lowest % of rooted cuttings) but slight on Measa (highest % of rooted cuttings) and Kuro.

NOHARA (Y.), ZINNO (Y.), & SATÔ (T.). **Experiments on the control of damping-off of Conifer seedlings (II.)** –*Bull. For. Exp. Sta. Meguro* 119, pp. 17–25, 1 fig., 19 graphs, 1960. [Jap. Abs. from Engl. summ.]

In further studies [**38**, 342] control at several forestry nurseries in the N.W. district of the Japanese main island, 1956–58, on Japanese larch [*Larix leptolepis*] and Japanese cedar [*Cryptomeria japonica*] was tested by combined burning and drenching with chemical. This proved most effective in preventing disease and aiding seedling growth. Of the 3 chemicals used, pyroligneous acid (crude, at 8 l./sq. m., except in 1 case) was most effective, followed by forcide (a powdered formalin), and uspulun. With some deviations the disease increased from June to Aug.

HIMELICK (E. B.) & NEELY (D.). **Juniper hosts of Cedar-Apple and Cedar-Hawthorn rust.**—*Plant Dis. Reptr*, **44**, 2, pp. 109–112, 1960.

This report from Ill. Natural History Survey, Urbana, based on field observations and previous reports, lists all spp., vars., and forms of *Juniperus* susceptible or resistant to *Gymnosporangium juniperi-virginianae* [cf. **38**, 755] and *G. globosum* [cf. **35**, 499]. Two spp. and 13 vars. susceptible to the former and 9 vars. susceptible to the latter are recorded for the 1st time.

MILLER (D. R.), KIMMEY (J. W.), & FOWLER (M. E.). **White Pine blister rust.**—*For. Pest Leafl. U.S. Dep. Agric.* 36, 8 pp., 3 fig., 1 diag., 1 map, 1959.

A survey of the disease as it occurs in the U.S., its distribution and hosts, the life cycle of *Cronartium ribicola* [**37**, 686 *et passim*], and the symptoms on pines and on *Ribes*, together with an outline of control by direct eradication of *R.*, silvicultural treatments, and breeding for resistance.

BERRY (C. R.) & HEPTING (G. H.). **Pitch canker of Southern Pines.**—*For. Pest Leafl. U.S. Dep. Agric.* 35, 3 pp., 2 fig., 1959.

A short account of the symptoms, pathogen, and importance of the disease caused by *Fusarium lateritium* f. *pini* [**27**, 224; **28**, 603; **35**, 562] on Virginia pine [*Pinus virginiana*]; it is also the most damaging disease of South Florida slash pine [*P. elliottii* = *P. caribaea*] and is the only one that can readily kill these pines regardless of size. Some control is obtainable by removal of infected trees.

RACK (K.). **Beziehungen zwischen Infektionsdichte und Nadelverlust bei der Kiefernschütte.** [Relationship between infection level and needle loss in Pine needle cast.]—*NachrBl. dtsch. PflSchDienst (Braunschweig), Stuttgart*, **11**, 12, pp. 177–181, 2 fig., 8 graphs, 1959. [Engl. summ.]

In an investigation by the Abteilung Forstschädlingsbekämpfung der Niedersächsischen Forstlichen Versuchsanstalt, Göttingen, the number of infection spots of *Lophodermium pinastri* [cf. **37**, 744; **39**, 130] visible at the beginning of Nov. 1957 on needle pairs of pines in 15 plots with different levels of infection was compared with the percentage needle loss in the following spring. Statistical evaluation of the findings indicated that the only needle pairs that died were those which had borne an av. of at least 9 spots. It is concluded that the extent of leaf cast can be forecast from an autumn inspection, made not before mid-Nov.; needles should be sampled at a standard level (50 cm. in these experiments), as the extent of the infection diminishes with increasing height above the ground. When curative sprays have been developed it will thus be possible to restrict spraying to those plots which really need it.

SPERBER (G. S.). **Strobennadelschütte.** [Needle fall of *Pinus strobus*.]—*Allg. Forstz.* **14**, 1, pp. 9–11, 1959. [*For. Abstr.*, **20**, 3, p. 415, 1959.]

Observations in the northern Spessart (Bavaria), where needle cast caused by *Hypoderma desmazierii* [cf. **32**, 525] particularly affects 10–20-yr.-old natural regeneration under pure or mixed *P. strobus* stands, showed that plantations and natural regeneration in the open were not affected. The disease causes die-back of the terminal shoot leading (after repeated infections) to distorted growth and, where there is competition from other shade-trees, to death.

MÜLLER (E.) & BAZZIGHER (G.). **Über einen für die Alpen neuen Pinus-Schädling.** [An injury to Pine new for the Alps.]—*Schweiz. Z. Forstw.*, **109**, 12, pp. 770–772, 1958. [*For. Abstr.*, **20**, 3, p. 415, 1959.]

Neopeckia coulteri [cf. **23**, 49], not hitherto recorded from Central Europe, is reported from Arosa (Grisons) [Switzerland] on *Pinus mugo* var. *pumilio*.

GIBSON (I. A. S.). **Armillaria root rot in Kenya Pine plantations.**—*Emp. For. Rev.*, **39**, 1 (99), pp. 94–99, 1960.

Field studies of *Armillaria mellea* root rot of pines [cf. **37**, 190] from 1953–59 indicated that the disease was most frequent and severe where planting was done after Montane rain forest and less so following Montane conifer forest. This is related to the frequency of occurrence of the fungus in these types of forest. Eucalyptus and cypress carry *A. mellea*, which gives rise to infection in subsequent pine plantings.

Infection was found to reach a peak in plantations of about 5 yr. old. *Pinus elliottii* var. *elliottii* is more susceptible than *P. radiata* and *P. patula*.

KILIAS (G.). **Was ist bei der Aufforstung von Ödland mit Kiefer zu beachten?** [What is to be taken into account when afforesting waste land with Pine?]

—*Dtsch. Landw., Berl.*, **10**, 1, pp. 43–47, 1959. [*For. Abstr.*, **20**, 3, p. 412, 1959.]

Studies at the Eberswalde Inst. on a disorder ('Nadelholzsterbe') of pine trees growing on waste and old agricultural land indicated that the condition is characterized by checking at 10–20 yr., this often being followed by death, the dead trees spreading out from focal points. *Fomes annosus* is invariably present. Well-developed root systems were found in pole-size trees, but the roots of 10–20-yr.-old trees were dying. In slightly affected trees the development of the root system is merely disturbed, but in severely affected both horizontal and vertical roots die, leaving the tree with a single root; resinosis of the lower part of the rootstock may take place and the taproot may also die. Three growth stages are distinguishable in affected but surviving trees: (1) fast growth up to about 15 yr.; (2) a falling-off between 15 and 60 yr.; and (3) recovery and very rapid growth subsequently. It is suggested that the disease is caused by *F. annosus*, possibly lacking competitors in non-forest soil.

Gendina (Mme S. B.). Микориза ускоряет рост Сосны. [Mycorrhiza accelerates growth of Pine.]—Лес. Хоз. [*Les. Khoz.*], **12**, 2, pp. 39–41, 1 fig., 1960.

A culture of *Boletus luteus* was used for treating pine and cedar seed with mycorrhiza before sowing at forestry establishments and nurseries in different regions of the U.S.S.R. The effects were studied in seedlings at the Moscow Sect., All-Union sci. Res. Inst. for agric. Microbiol. In 1957 at the Krasnoyarsk Forestry Establishment, Kuĭbȳshev region, the growth [in length] of 1-yr.-old pine seedlings from treated seed was 58% better, the main root was 25% longer, wt. of the aerial part and needles were 70% more, and N and ash content 71% higher. Over 50% of the seedlings from treated seed were 3–6 cm. high. At the Sorochinskoe Forestry Establishment, Orenburg region, there was a 90% increase in wt. of the aerial part, a 101% in needle wt., and 123% in N content. At the Tatȳshlinskoe Forestry Establishment, Bashkir S.S.R., the height of seedlings from treated cedar seed was 22% more, wt. of aerial part 26·5%, and N and ash content 20%; 2-yr.-old seedlings at the Krasnoyarsk Forestry Establishment were twice as tall (16·5 cm.) as similar seedlings from untreated seed (7·3), the root system was better developed (more laterals), and mycorrhiza were more copious. At the Bekovskoe Forestry Establishment, Penza region, on chernozem type sandy loam *B. luteus* stimulated the accumulation of organic substance, increased N content by 46%, and gave better root development.

Salyaev (R. K.). Анатомическое строение корневых окончаний взрослой Сосны и ход формирования на них микориз. [Anatomical structure of root tips in mature Pine and the formation of mycorrhiza on them.]—*Bot. Zh. S.S.S.R.*, **43**, 6, pp. 869–876, 7 fig., 1958.

Observations at Technical Acad. Forestry, Leningrad, revealed that during the spring (from mid-May to the end of June) and autumn (mid-Sept. to the end of Oct.) growth periods the tips of absorbing roots were covered with mycorrhiza [cf. **33**, 494], while the Hartig net started to extend along the new part about 3 weeks after the beginning of growth and reached the tip by the time of rest. Roots growing slowly were much the same, except that their tips sometimes burst through the mycorrhizal weft, whereas roots growing rapidly left their mycorrhiza behind.

Bakshi (B. K.) & Thapar (H. S.). **Mycorrhizae in Taxus baccata and Pinus wallichiana.**—*Indian For.*, **86**, 1, pp. 16–17, 1 pl. (4 fig.), 1960.

The mycorrhiza of yew [cf. **5**, 570], studied at For. Res. Inst., Dehra Dun, India, were typically endotrophic, the mycelium consisting of brown, thick-walled, slightly coiled hyphae, 3–5·3 μ diam., scantily septate and free from arbuscles and

vesicles. Ectotrophic mycorrhiza of blue pine (*P. wallichiana*) enveloped the branches of the laterals with a pseudoparenchymatous mantle separated from the root tissue by a dark-brown tannin-containing zone. The mantle was formed of either hyaline hyphae in 10–12 cell layers (total width 27–45 μ) or light-brown septate thick-walled hyphae in 6–7 cell layers (27–39 μ), both with clamp connexions. The trees were in the temperate Himalayas at 7,000–10,000 ft.

Kiselev (A. K.) & Sinitsÿna (Mme T. G.). Протравливание семян гранозаном и меркураном перед хранением. [Pre-storage seed treatment with granosan and mercuran.]—Лес. Хоз. [*Les. Khoz.*], **12**, 2, p. 42, 1960.

At the Belorussian Tree Seed Testing Sta. in 1956 seed of common pine (germination 90%) infected by *Alternaria*, *Hormiscium*, *Penicillium*, and *Mucor*, and common fir [spruce] (germination 87%), infected by *Penicillium*, *Trichoderma*, and *Mucor* was treated with granosan or mercuran (1–2–3 g./kg. seed) and kept at 4–8° [C.] and 34–45% R.H. Samples were tested every 6 months. Treated seed in open containers retained good germination for almost 3 yr. The fungus flora at the outset subsequently disappeared. In hermetically sealed containers germination and germination energy were reduced by 10–15% after 6 months. After 1 yr. storage some of the treated seed sown in clay soil at the Shchemÿslitsa nursery, Minsk area, germinated 40–55% (pine) and 30–37% (spruce). High quality seed, therefore, with much fungal infection should be given dry treatment with granosan or mercuran before storage, the opt. dose being 1 g./kg. seed. Seed should be stored in closed glass bottles, not hermetically sealed.

Molin (N.) & Rennerfelt (E.). **Honungsskivlingen, Armillaria mellea (Vahl) Quél., som parasit på barrträd.** [The honey mushroom, *A. mellea*, as a parasite on softwoods.]—*Medd. SkogsforsknInst., Stockh.*, **48**, 10, 26 pp., 10 fig., 2 diag., 2 graphs, 1959. [Engl. summ. 22 ref.]

Much of the information in this comprehensive study has already been noticed from other sources [**37**, 253; **38**, 633 *et passim*]. From the results of spruce root-system analyses and observations on symptom development covering a 10-yr. period on experimental sites in central Sweden *A. mellea* appears to be the agent of 'little leaf', characterized by interruption of growth, gradual loss of vigour, and in the later stages by increasing chlorosis of the needles. The fungus also kills both spruce and pine rapidly in locally restricted areas [cf. **39**, 355].

After felling, the mycelium proceeds very quickly from spruce stumps to the roots, frequently infecting healthy ones but neither spreading nor producing symptoms of disease in the tree. In this form of controlled parasitism *A. mellea* acts as a pseudomycorrhiza, but under certain ecological conditions, e.g. on soils with a high humus content, it may gain the upper hand.

The data collected in these investigations support the view that the normal mode of transmission of infection from tree to tree is through root contacts [**15**, 261], spread by means of rhizomorphs [**32**, 332] growing through the humus layer being of minor importance except at distances of less than 1 m. Aerial infection by spores may also occur, as was demonstrated by the frequent development of mycelium on exposed surfaces of spruce, pine, and birch sections.

As an agent of butt rot *A. mellea* is considered to be less important than *Fomes annosus*.

Day (W. R.). **The influence of pathogenic factors in the rooting space on the development of even-aged plantations.**—*Emp. For. Rev.*, **39**, 1 (99), pp. 38–53, 6 fig., 1 graph, 1960.

The author develops the theme that the development of a stand of forest trees of even age is fundamentally a function of the climate and the supply characteristics

of the soil. Where the soil will not properly support the growth which the tree will attempt to make under given climatic conditions, weakness, exploited by pests and diseases, will follow. A number of references are made to his own experience with Sitka spruce [**35**, 190]. In one instance there was *Pythium* infection of the finer roots of a stand on poorly drained clay of moderate acidity. Another example was that of a 45-yr. stand growing in a dune area of Jutland, Denmark, on chalky boulder clay overlain by blown sand: root-branching was restricted by the nature of the soil, and in consequence the plantation was badly affected by drought in 1947. Subsequently there was severe attack by the beetle *Dendroctonus micans*, and *Fomes annosus* was also present. These same 2 agents were also present in a 44 yr. stand on an acid gravel soil, where deep ploughing, and mulching with sand, had permitted abundant rooting, but only at the surface.

[Another version of this article appeared in *Quart. J. For.*, **54**, 1, pp. 33–53, 6 diag., 1 graph, 1960.]

Studies on the protection of Beech green log from insect and fungus attack.—*Bull. For. Exp. Sta. Meguro* 120, pp. 1–109, 6 pl., 12 fig., 51 graphs, 1960. [Jap. Abs. from Engl. summ. pp. 100–109.]

It was concluded from these extensive experiments carried out in 1952–54 on 5 experimental plots in central Honshu, Japan, that spraying soon after felling with a mixed emulsion of 2–5% pentachlorophenol or 15–30% coal tar creosote with 2% gamma-BHC at 130 ml./cu.m. was effective during the warm and rainy season in reducing deterioration of beech (*Fagus crenatus*) logs by insects and fungi, including the wood-staining fungi found in the cut ends of logs, i.e. *Ophiostoma pluriannulata* [*Ceratocystis pluriannulata*] and *O.* [*C.*] *piceae* causing blue stain), and *Endoconidiophora* [*C.*] *moniliformis* causing brown stain, and the wood-rotting fungi *Schizophyllum commune*, *Stereum purpureum*, *Coriolus hirsutus* [*S. hirsutum*], *C.* [*Polystictus*] *versicolor*, *Lenzites betulina* [**35**, 500], and others; *O. steroceras* (blue stain) was sometimes found associated with bark beetles. Placing the treated logs under shaded and wet conditions enhanced the effectiveness of the treatment. The application of end coating in addition to spraying gave better control of deterioration by fungi.

Liese (W.). **Report to the Government of India on Bamboo preservation and soft rot.** —*Rep.* 1106 (FAO/59/7/5488), 3 (unnumbered)+37 pp., 17 fig., 1 graph, 1959. [Cyclostyled.]

These investigations have thrown light on the considerable extent of damage caused in India by soft rot fungi to cellulosic materials, such as bamboo [cf. **39**, 63], canes, and timber, used for constructional purposes, a subject little studied there hitherto. Laboratory tests on bamboo inoculated with *Chaetomium globosum* showed a wt. loss of 15% after 4 weeks exposure in a soil block test, equal to a strength loss of over 40%. Necessary steps to investigate methods of prevention, for the identification of the responsible organisms, and for the use of the electron microscope as an aid to the study of the anatomy of wood and bamboo are outlined.

Ramsey (G. B.), Friedman (B. A.), & Smith (M. A.). **Market diseases of Beets, Chicory, Endive, Escarole, Globe Artichokes, Lettuce, Rhubarb, Spinach, and Sweetpotatoes.**—*Agric. Handb. U.S. Dep. Agric.* 155, ii+42 pp., 19 pl., 1959. [134 ref.]

This useful booklet supersedes *Misc. Publ.* 541 [**24,** 172]. A general note on each crop is followed by descriptions of the chief diseases, casual organism if a pathogen is involved, and control methods.

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